Picturing Movement:
Domenico Fontana's Vatican Obelisk Project
and Its Afterimage

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For my grandparents,

Lydia and Romualdo

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ABSTRACT

In 1585, Domenico Fontana (1543-1607) devised a machine to move the Vatican obelisk to a new location, aligned with the façade of St. Peter's basilica. The event's narrative has featured prominently in histories of Rome. Its critical assessment in recent architectural scholarship however, has widely framed it as a feat of engineering. I argue that Fontana and his contemporaries understood the practice of translating monoliths as a symbolic intervention that inflected on the architect's role. In order to reassert the project's appropriate context, this dissertation considers the obelisk's transportation within the contemporaneous discourse on the nature of movement and the status of mechanics. Writings by inventor Camillo Agrippa (c.1535-c.1598), antiquarian Michele Mercati (1541-1593), and mechanical philosopher Filippo Pigafetta (1533-1603) shaped the project's motivations and reveal the metaphysical dimension of the stone's translocation. Fontana's own book, *Della trasportatione* (Rome, 1590) reenacted the process of movement.

In the seventeenth century, when Galilean thought challenged Aristotelian concepts of motion and place, and, a shift towards a mechanical world-picture occurred, the cosmological meanings embodied by Fontana's obelisk project receded. Seventeenth-century interpretations of the Vatican obelisk project—most notably in Carlo Fontana's *Tempio Vaticano* (1694)—presented a new understanding of the machine and its relationship to building practice. The Vatican obelisk project and its afterimage thus epitomize the changing concept of movement. This thesis reconsiders the approach to the technical in architecture by revisiting the sixteenth-century understanding of movement and translocation as an architectural practice.

ABRÉGÉ

En 1585, Dominico Fontana (1543-1607) conçoit une machine afin de transporter l'obélisque du Vatican vers un nouvel emplacement, centré sur la façade de la basilique Saint-Pierre. Le récit de l'évènement a occupé une place importante dans les récits historiques de Rome. Son évaluation critique dans la littérature académique récente l'a surtout présenté comme un exploit d'ingénierie. Je soutiens que Domenico Fontana et ses contemporains comprirent la pratique de transporter les monolithes comme une pratique propre au rôle de l'architecte. Afin de présenter le juste contexte du projet, cette dissertation considère le déplacement de l'obélisque au sein des discours, portant sur la nature du mouvement et du statut de la mécanique contemporain. Les écrits de l'inventeur Camillo Agrippa (c1535-c1598), de l'antiquaire Michele Mercati (1541-1593), et ceux du philosophe mécanique Filippo Pigafetta (1533-1603), ont donné forme aux motivations qui ont mené au projet, et révèlent la dimension métaphysique du déplacement de la pierre. Quant au livre de Fontana intitulé *Della trasportatione* (Rome, 1590), il recrée le processus de mouvement, tant par son texte que par ses gravures.

Au XVIIe siècle, alors que la pensée galiléenne remet en question les concepts aristotéliciens de mouvement et, au moment où s'opère un glissement vers une vision mécaniste du monde, les significations cosmologiques incarnées par le projet de Fontana s'effacent. À cette époque, les interprétations du projet de l'obélisque du Vatican, notamment dans le *Tempio Vaticano* (1694) de Carlo Fontana (1634-1714), présentent une nouvelle compréhension de la machine ainsi que de sa relation à la pratique constructive. Le projet et son après-image exemplifie ce changement dans la conception du mouvement. Cette thèse reconsidère le rapport à la technique en architecture en considérant la compréhension de la notion de mouvement et de déplacement comme pratique architecturale au XVIe siècle.

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AFSP	Archivio della Fabbrica di San Pietro
ASR	Archivio di Stato di Roma
ASV	Archivio Segreto di Vaticano
BiASA	Biblioteca di Archeologia e Storia dell'Arte
CCA	Canadian Centre for Architecture, Montreal
JSAH	Journal of the Society of Architectural Historians

INTRODUCTION

Under an order of silence, the crowd waited at the edge of the barrier. The architect sounded the trumpet, the winches groaned, the earth moved, and the obelisk was now under the power of the machine. It was an undertaking long in the making. For almost two centuries, the Renaissance popes had deliberated over moving the Vatican obelisk to a more honoured position in front of St. Peter's basilica from a neglected alley behind the church. As the only Egyptian obelisk still standing in Rome (though partially buried), and a reputed witness to the martyrdom of Saint Peter, the Vaticanus, was inextricably bound to the mythology of pilgrimage.

In 1586, Domenico Fontana and his patron Sixtus V finally realized the task once deemed impossible. After months of preparation, the day arrived to remove the obelisk from its ancient pedestal and prepare it for transportation. With materials procured, crews gathered, and the machinery in place, the first stage of the operation was ready. The day began hours before dawn with two masses. A large crowd had assembled to hear the architect's first command, bidding all to kneel for the *Pater Noster* and *Ave Maria*. Fontana arose from his command post, gave the signal, and an army of seventy-five horses and nine hundred men behind forty windlasses and four levers initiated the movement. A bell signaled the end of this first move, at which point the ropes and machinery were inspected and necessary repairs were made. This entire process was repeated for twelve revolutions of the windlasses until the obelisk was raised from the ancient pedestal, approximately two feet, and laid to rest on a timber carriage. By ten o'clock in the evening, gunfire would signal the end of the labour.

This narrative of the event's first phase is recounted in Domenico Fontana's *Della trasportatione dell'obelisco Vaticano* (Rome, 1590).[1] The illustrations, drawn by Giovanni Guerra (1544-1618) and engraved by Natale Bonifacio (1538-1592), mark the scaffold's construction, the positioning of the apparatus, and the arrangement of the machine's moving parts. Each image depicts the sensorial and temporal dimensions of the obelisk's movement. The visual narrative similarly transforms the obelisk's orientation and placement as the process unfolds. Since the seventeenth century, interpretations of Fontana's Vatican obelisk project have shifted this phenomenal emphasis. More recent scholarship has described *Della trasportatione* as a hybrid of an engineering manual and a festival book.[2] Fontana's project encompasses the developing mechanical culture of the late sixteenth century, and in its representation underlines a transitional moment in the world picture.

This dissertation situates *Della trasportatione* (1590) within a larger body of sixteenth- and seventeenth-century literature on the philosophy of movement. My research identifies a relationship between Fontana's Vatican obelisk project and the changing cosmology of his age. Sixteenth-century studies on fencing technique, machines, the science of weights, metallurgy, and the translation of relics, share a terminology that evoke perceptions of the sixteenth-century idea of movement both in physical and symbolic terms. The following chapters examine how

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[1] This account of events appears in Domenico Fontana, *Della trasportatione dell'obelisco Vaticano et delle fabriche de nostra Signore Papa Sisto V* (Rome: Domenico Basa, 1590). A similar account appears in Michele Mercati, *De gli obelischi di Roma* (Rome: Domenico Basa, 1589).

[2] One such assessment came about in the recent English translation of *Della trasportatione*. The introductory essay places the work as a curious blending of these traditions: the fête-book and the engineering treatise. Ingrid Rowland et. al, *Della Trasportatione dell'Obelisco Vaticano* by Domenico Fontana, trans. David Sullivan. Digital facsimile of the work published in 1590, from the copy in the Library of Congress (Oakland: Octavo, 2002).

these areas of thought intersect in order to demonstrate how Fontana manifested the new cosmological order of the world through the obelisk's translocation.

At the end of the sixteenth century, a new paradigm of movement and motion, heralded by Galileo, would shatter the predominant Aristotelian world view, which dictated that motion, like place, is a quality attributed to an object undergoing a process of change. Consequently, motion and movement were overturned as metaphysical concepts and increasingly understood in empirical terms.[3] This shift in cosmology or, better, the 'mechanization of the world picture' precipitated a 'crisis of the senses.' [4] This thesis underscores how the transformed world picture affected the understanding of movement as an embodied experience.[5] The representation of bodies in motion would also endure significant changes.

The first documented effort to move the obelisk in the late sixteenth century, a device proposed by inventor Camillo Agrippa, is critical to this discourse. Agrippa's bid for the obelisk commission was published in *Trattato di Camillo Agrippa Milanese di trasportar la guglia in su la piazza di San Pietro* (1583).[6] Ultimately his design would not secure the commission. A closer look at his writings, however, reveals the cosmological understanding that, in Agrippa's view,

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[3] See David C. Lindberg's discussion of the lesser importance of the phenomenon of motion in the Aristotelian view of nature in "The Physics of the Sublunar Region," in *The Beginnings of Western Science: The European Scientific Tradition in Philosophical, Religious, and Institutional Context, Prehistory to A.D. 1550*, 2nd ed. (Chicago: University of Chicago Press, 2007), 286-320. On Aristotelianisms in the sixteenth century see Charles B. Schmitt, *Aristotle in the Renaissance* (Cambridge, MA: Harvard University Press, 1983).

[4] E.J. Dijksterhuis, *The Mechanization of the World Picture: Pythagoras to Newton*, trans. C. Dijkshoorn (Princeton, NJ: Princeton University Press, 1950).

[5] For a critical discussion of newly formed theories of the body and its relation to the new paradigm of movement (and the aforementioned "crisis of the senses"), see Richard Sennett, "Chapter 8: Moving Bodies: Harvey's Revolution," in *Flesh and Stone*: *The Body and the City in Western Civilization* (New York: W.W. Norton, 1994), 255-281.

[6] Camillo Agrippa, *Trattato di trasportar la guglia* was a small pamphlet outlining his concept for moving the Vatican obelisk, accompanied by a philosophical dialogue and an engraved diagram of his device (Rome: Francesco Zanetti, 1583).

underpinned the obelisk's transport. His fencing manual, *Trattato di Scientia d'Arme* (1553), explains the principles of a human body in motion as a reflection of the cosmos. Agrippa's technical writings, whether on the art of fencing or the transportation of obelisks, focused on the theme of movement and its cosmological implications.

Domenico Fontana's text was but one of the works devoted to the moving of the Vatican obelisk published in the 1580s. Michele Mercati published *De gli obelischi di Roma* (1589), a treatise on the archaeological and mystical origins of the Egyptian obelisks in Rome. Filippo Pigafetta's book *Discorso d'intorno all'historia della aguglia et alla ragione del muoverla* was printed just as preparations to move the Vaticanus were underway (1586). Domenico Basa, the Roman publisher, produced all of these publications with the same papal *privilegio*.[7]

The prevailing literature devoted to the relocation of the Vatican obelisk, from the first half of the twentieth century in particular, qualifies Fontana's accomplishment as a feat of engineering. Fittingly, this approach originates in the writings of engineer-scholars and is widely characterized as an analysis of the technical aspects of the project. These studies constitute the backbone of scholarship on the Vatican obelisk project, since they focus on the concept and execution of Domenico Fontana's plan and its 'soundness.' *Della trasportatione* establishes a record of sixteenth-century procedures for constructing the machine and its apparatus; it also describes the modifications that had to be made on site and the procurement of materials. Several authors have considered it from the standpoint of modern engineering and technology. William Parson's *Engineers and Engineering in the Renaissance* (1939) provides an early survey of the history of technology during the Renaissance with a focus on public works and devotes one

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[7] Christopher Witcombe examines the obelisk literature produced under the papacy of Sixtus V in *Copyright in the Renaissance: Prints and the Privilegio in Sixteenth-Century Venice and Rome* (Leiden, The Netherlands: Brill, 2004).

chapter to the documentation and mechanics of the Vatican obelisk project.[8] With a similar focus, Bern Dibner's *Moving the Obelisks* (1950) featured Fontana's project in the context of modern equivalents in New York, London, and Paris.[9]

Since the writings of Pliny, there has been a longstanding fascination with the transportation of colossal stones, monoliths, and columns.[10] Given the sheer scale and weight of the Vatican obelisk, its transport across even short distances would appear magical. Accordingly, *Della trasportatione* stakes its claim on a method originating in the ancients. In a period characterized as the "Age of the Marvelous", Fontana's project fits in as an extraordinary enterprise, bolstered by the incessant debate about its feasibility in the preceding pontificates.[11]

Current scholarship has increasingly embraced contemporary sources to challenge and enrich *Della trasportatione*'s discourse on "technique." This branch of research pursues the derivation of Fontana's machine from prototypes of obelisk-raising devices in the architectural tradition established by Leon Battista Alberti's *De re aedificatoria* and in Marcus Polio

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[8] William Parsons "Moving the Vatican Obelisk." *Engineers and Engineering in the Renaissance* (Cambridge, MA: Williams and Wilkins, 1939), 155-73.

[9] Bern Dibner, *Moving the Obelisks: A chapter in engineering history in which the Vatican obelisk in Rome in 1586 was moved by muscle power, a study of more recent similar moves* (Norwalk, Connecticut: Burndy Library, 1950).

[10] Pliny the Elder, *Natural History*, X, 36-7, trans. D.E. Eichholz, Loeb Classical Library 419 (Cambridge, MA: Harvard University Press, 1962). The Vatican Obelisk Project has been useful as a guide on the methods and machinery the ancients used for monumental works, such as those used to build Trajan's Column. See Lynne Lancaster, "Building Trajan's Column" in *American Journal of Archaeology* 103, no. 3 (July 1999): 419-39.

[11] See for example, the discussion of the performance of impossible feats as one of the categories of the marvelous in Joy Kenseth's introductory essay to *The Age of the Marvelous*, ed. Joy Kenseth (Hanover, NH: Hood Museum of Art at Dartmouth College, 1991), 46-8.

Vitruvius' *De architectura libri decem*. [12] This line of inquiry opened up the potential to compare the project with the development of other Renaissance machines in terms of technology, representation, and symbolism.

An expanding field of literature examines the influence of Fontana's transportation in a web of other industrial factors.[13] Its importance as a precedent for the construction methods at the *fabbrica* of St. Peter's is one such area of study.[14] Still others cite Fontana's project as a technological milestone in the culture of mechanics. Fontana's book is visual evidence of the impact of the use of machines in civic spaces. A recent study on machines in the Renaissance imaginary by Jonathan Sawday for instance, presents the Vatican obelisk project as a reflection of these changing ideals more than as a model for technical performance.[15] An important aspect of the Vatican obelisk project, vis-a-vis the technical interpretation, is the representation of devices and machines. A representational shift occurs after Galileo in the aspirations of technical

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[12] The most important contribution to this direction in the Vatican obelisk scholarship is Adriano Carugo, "Obelisks and Machines in the Renaissance," *Della trasportatione dell'obelisco Vaticano, by Domenico Fontana, 1590: A facsimile of the first edition*, ed. Adriano Carugo (Milan: Edizioni il Polifilo, 1978). Two versions of this essay appear in the text, one in Italian and one in English. The English version contains the same content but uses a reduced version of the quotations from Carugo's primary sources.

[13] Pamela O. Long has completed important work on the Vatican obelisk project, which was published in Brian Curran et al, *Obelisk: A History* (Cambridge, MA: Burndy Library, 2009). Like Richard Goldthwaite's seminal study *The Building of Renaissance Florence: An Economic and Social History* (Baltimore: John Hopkins University Press, 1980), Long's recent publication *Artisan/Practitioners and the Rise of the New Sciences* looks at the broader social and economic factors that the Vatican obelisk project would have entailed. See Long, "Chapter 4: Trading Zones: Arenas of Production and Exchange," in *Artisan/Practitioners and the Rise of the New Sciences, 1400-1600* (Corvallis, OR: Oregon State University Press, 2011).

[14] See Giovanna Curcio, Nicola Navone, Sergio Villari, eds. *Studi su Domenico Fontana* (Mendrisio: Fondazione Archivio del Moderno, 2011).

[15] Jonathan Sawday, "Philosophy, Power, and Politics in Renaissance Technology," *Engines of the Imagination: Renaissance Culture and the Rise of the Machine* (New York: Routledge, 2007), 31-69.

drawing towards greater precision and 'accuracy'.[16] I track this change from the speculative realm of machine drawing that one sees in a 'Theatre of Machines' like Agostino Ramelli's *Diverse et artificiose machine* (1588), to their presentation as a practical guide for the architect, as in Carlo Fontana's *Tempio Vaticano* (1694). The Vatican obelisk project, demonstrates this transition through its images, particularly the differences between Domenico Fontana and Carlo Fontana's publications.

Other discourses on Domenico Fontana's undertaking engage it as part of a history of the obelisks and their importance to the histories and mythologies of Rome. Contemporary scholarship in this vein demonstrates an understanding of the allegorical meanings of obelisks and their pagan roots as symbols of magic. These texts focus on the obelisks as artefacts and their position in the city's history, with Domenico Fontana playing a secondary role to their modern afterlife. This shift paved the way for modern research on the hermetic influence in Sixtus's obelisk program.[17] A related field is focused precisely on obelisks and Egypt and their enduring significance in urban cultural history. Examples include Cesare D'Onofrio's comprehensive examination of the life of the obelisks of Rome *Gli obelischi di Roma*, first published in 1965, and Danish Egyptologist Erik Iversen's archaeological treatment in *Obelisks in Exile* (1968). The most recent iteration of this approach is a modern interdisciplinary omnibus

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[16] Although this characterization has had a tendency to oversimplify the approach to drawing, as demonstrated by Michael S. Mahoney, "Drawing Mechanics," in *Picturing Machines:1400-1700*, ed. Wolfgang Lefèvre (Cambridge, MA.: MIT Press, 2004), 281-306.

[17] Giovanni Cipriani, *Gli obelischi egizi: politica e cultura nella Roma barocca* (Florence: Leo S. Olschki Editore, 1993).

co-authored by Brian A. Curran, Anthony Grafton, Pamela O. Long and Benjamin Weiss entitled *Obelisk: A History*.[18]

Easily the largest gap in scholarship on Fontana's project is the lack of in-depth treatments of *Della trasportatione* (1590). The book-as-project has, therefore, rarely been considered part of Fontana's contribution to the field of architecture and engineering and is often portrayed as evidence of Fontana's political and social ambition. [19] Although present scholarship includes detailed studies on the Vatican obelisk project in the context of Sixtine urbanism, Egyptian obelisks, the history of engineering and Domenico Fontana's career — there is no detailed study of the implications of the Vatican obelisk project and the sixteenth-century perception of movement. Further, how the theme of movement was indelibly changed after 1600, and how this shift is reflected in the project's image has only been cursorily examined.

The theme of movement and its representation will be the subject of our inquiry with the book as the locus of my research. Terms used to define the obelisk's movement in the prevailing literature—transport, transfer, translate—convey the idea of a change of meaning as well as a physical change of place. This dissertation takes Fontana's Vatican obelisk project as a work subject to hermeneutic motion.[20] Its use of language, documentation, and illustrations make it the ideal for the study of movement as an embodied experience of architecture. Each chapter focuses

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[18] Cesare d'Onofrio, *Gli obelischi di Roma: storia e urbanistica di una città dall'età antica al XX secolo*, 3rd ed. (Rome: Romana Società Editrice, 1992); Erik Iversen, *The Obelisks of Rome*, vol. 1 of *Obelisks in Exile* (Copenhagen: Gad, 1968); Brian A. Curran et al., *Obelisk a History* (Cambridge, MA: Burndy Library, 2009).

[19] A vast amount of the secondary literature on the Vatican obelisk project is in Italian. The lack of English scholarship seems to reflect a lack of accessible archival resources as well as a tendency in recent studies to follow regional interests organized according to Fontana's Ticinese, Roman and Neapolitan legacies.

[20] George Steiner defined "the hermeneutic motion" as "the act of elicitation and appropriative transfer of meaning" in *After Babel: Aspects of Language and Translation*, 3rd ed. (Oxford: Oxford University Press, 1998), 312.

on a different body of literature and its relation to the Vatican obelisk project. The spectacular images and text in *Della trasportatione* were obvious source material but my intention has been to look at the event in the context of a broader reading of sixteenth-century perceptions of movement, including treatises on mechanics, fencing, natural philosophy and antiquarianism.

CHAPTER SYNOPSIS

The following chapters map the Vatican obelisk project and its interpretation as a case study from the 1580s to 1700. The first two chapters focus on the literature on movement that preceded Domenico Fontana's project, or contributed to its conception; chapters three and four examine Fontana's enterprise in the planning stage, during its execution, and finally its presentation in *Della trasportatione* (1590); the final chapter traces the afterlife of the obelisk project in new interpretations of the text and images.

Chapter one establishes the theme of movement and transportation and provides the necessary context for a more detailed examination of Fontana's intentions. It answers the ever-persistent question: why obelisks? Furthermore, it examines how the project fits into the culture of the late sixteenth-century that was on the cusp of the Galilean revolution. First, I provide an overview of the scholarly positions on Domenico Fontana's relationship to his patron Sixtus V. The following section discusses Sixtus V and his participation in the cult of relics, pilgrimage and sacred procession as evidence of his fascination with sacred transportable architecture. The focus then shifts to an analysis of Michele Mercati's *De gli obelischi a Roma* (1589) and its study of the nature of obelisks and their transportation. Through analysis of these phenomena, this chapter hopes to reveal the nuanced understandings of transportation (*trasportatione*) and translation (*traslatio*), and how they informed the concept of movement.

Before Domenico Fontana won the competition for the obelisk's removal, inventor Camillo Agrippa presented his own proposal. This device and its explanation circulated in a small publication, *Trattato di trasportar la guglia* (1583). Chapter two is a detailed study of Agrippa's concept of movement and how he applied it to his proposed device for the Vatican obelisk project. Agrippa's most famous work, on the art of fencing, *Trattato di Scientia d'Arme* (1553) is situated as the model for how he conceived the obelisk project. This chapter probes Agrippa's views on cosmology, movement and the body and how they informed his concept for the obelisk to demonstrate the late sixteenth-century shared understanding of movement.

Chapter three examines the details of the events leading up to the project's realization, in an effort to elucidate Fontana's role as *conduttore*. *Della trasportatione* (1590) provides a narrative of Fontana's method, but also establishes the architect's special embodiment of artificer, technician and coordinator. His treatise reflects the tension between architecture and mechanics in the sixteenth century. For example, how did Filippo Pigafetta's discourse on machines relate to the understanding of Domenico's vision? This chapter sets out to show how the machine, the demonstration of its effects, and its manipulation were understood as realizing theoretical ideas about the nature of motion. It therefore situates the discussion about the project in the culture of machines. Texts such as Agostino Ramelli's *Degli artificiosi ingegni* (1588) strategically reveal the concept of the architect as technical expert and organizational authority by framing the obelisk competition as performance.

Chapter four explores the realization of the project as the obelisk was moved to the piazza of St. Peter's and its metaphysical meanings. Each section in this chapter analyzes one of the stages of the obelisk's movement and how they culminated in its conversion. Conventions of

representation will be explored and how they point to a metaphysical understanding of movement and consequently its conceptualization in the sixteenth century.

The fifth and final chapter of this dissertation focuses on the project's afterimage. After an overview of the transmission of *Della trasportatione* in the seventeenth-century, the chapter focuses on Carlo Fontana's treatment of the transport of the obelisk in *Tempio Vaticano* (1694). Carlo presented his theory of architectural practice through his study of this building and configured the obelisk as one of its focal points. The *Tempio* also presented Carlo's support of measurement and encapsulated a system of architecture. This discussion focuses on a comparison of the drawings in *Tempio Vaticano* with their original versions in *Della trasportatione*. These drawings show the transformation from a metaphysics of movement to a mechanics of movement.

CHAPTER 1

ON THE TRANSPORTATION OF THE VATICAN OBELISK

One of the primary goals of this dissertation is to show the larger set of practices and ideas entailed in definitions of "transportation" and "translation", and how these terms are linked with the sixteenth-century concept of movement. In order to set up this analysis, I first deal with how Domenico Fontana's intentions for writing his book *Della trasportatione* parallel his original concept for the project. The enterprise of erecting the obelisk was the keystone in a larger program of papal works. Sixtus V's disposition ostensibly did not allow for deep reflection on the implications of his widely adopted practice of transporting Egyptian artifacts and ancient relics. In Sixtine Rome, the dramatic theatre of pilgrimage and translation of relics, characterized the building program. With the number of obelisks transported during his pontificate—four in total—as well as columns, chapels and relics, Sixtus V seemed to have a propensity for transporting architecture. Sixtus V is not the focus of this thesis, or of this chapter, and yet his role is inextricable from the narrative. This chapter will further explore this aspect of Sixtine urbanism and its implications for the discussion on movement. The last section of this contextual survey of the 1580s introduces and analyses the genealogy of the Egyptian obelisks in Rome by Michele Mercati (*De gli obelischi di Roma*, 1589). Since Mercati demonstrated an interest in the obelisks even before the Sixtine pontificate, and because this fascination with these antiquities extends back to their very origins in Egyptian culture – his book on obelisks appropriately

introduces the themes. In short, Mercati's view on obelisks encapsulates several important definitions of transportation and the erection of obelisks that will be developed in later chapters.

DOMENICO FONTANA AND WRITING *DELLA TRASPORTATIONE*

Domenico Fontana (1543-1607), born in Melide, Switzerland, came from a family of *stuccatori*, architects, and *ingegneri* (among them his brother Giovanni Fontana, and his relatives Carlo Maderno, Francesco Borromini and Carlo Fontana).[21] Trained as an architect, Fontana's fame stemmed from his successful execution of the Vatican obelisk project in 1586. According to Fontana, he intended to write a book inspired by the obelisk's transportation, even before the project's completion:

> Now, when I had been commissioned by His Holiness (as will become clear in the course of the present little book) to transport this obelisk, which at first stood in a place little visited by people, in order to erect it in the middle of the piazza of the Basilica of St. Peter, I made a mental resolution to put into writing the progress of this undertaking. I intend (insofar as my feeble forces allow) to leave some notice of this work solely in order to be of some benefit to those who may have occasion to move stones that are so heavy and in such danger of shatter.[22]

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[21] A collection of essays on the Fontana family legacy in Baroque architecture is available in Marcello Fagiolo and Giuseppe Bonaccorso, eds. *Studi sui Fontana: una dinastia di architetto ticinesi a Roma tra Manierismo e Barocco* (Rome: Gangemi Editore, 2008). This book includes major contributions on the Fontana family, written in Italian (including the biographies and genealogical study of the branches of Domenico's family tree).

[22] Fontana, *Della trasportatione*, fol. 3v. English translation by David Sullivan for the Library of Congress (Oakland: Octavo, 2002), 5-6. I have relied on Sullivan's translation of the text for greater clarity in my writing. Where deemed necessary, I will provide my own translation of key passages. The Italian reads as follows: *Hor dunque e essendomi staro comesso da Sua Santità (come s'intenderà di parte in parte nel presente libro) la trasportatione di questo Obelisco, che stave prima in loco poco frequentato da gli huomini, per drizzarlo nel mezo della Piazza di San Pietro, mi sono proposto nell'animo di porre in iscritto, quanto sia seguito intorno a questa impresa: perche io miro solo (per quanto le mie deboli forze comportano) di lasciar qualche notitia di quest' opera, acciò habbia à risultare in beneficio di coloro, à quali occorresse il muovere farsi tanto gravi, e pericolosi à spezzarti.*

The undertaking to move the Vatican obelisk, as the above passage indicates, epitomized the Sixtine building program and its motivations. It would also serve as a precedent and symbol for the later relocation of obelisks at Santa Maria Maggiore (1587), St. John the Lateran (1588) and Santa Maria del Popolo (1589), as well as the restoration and translocations of the Old Chapel of the Manger (1587) and the Scala Santa (1588).[23] For Fontana, the "occasion of demonstrating the art of transporting the needle"[24] was an appropriate venue to commemorate these other achievements. The frontispiece of the book, fully titled, "On the Transportation of the Vatican Obelisk and the Built Works of Our Lord Pope Sixtus V", depicts Domenico Fontana bearing the obelisk as a trophy (fig 1.1).[25]

Fontana's story tends to rely heavily on the records of his earliest biographers, Giovanni Baglione (1649), Giovanni Pietro Bellori (1672) and Francesco Milizia (1781).[26] Since Antonio Muñoz's, *Domenico Fontana Architetto* in 1944, there have been no monographs that encompass the breadth of the architect's career and none published in English.[27] Paola Carla Verde's *Domenico Fontana a Napoli* was the first monograph to present a comprehensive review of Fontana literature with an emphasis on his Neapolitan projects. By all accounts, the body of

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[23] For a discussion of the Sixtine project for the Scala Santa, including how it was moved and the discrepancies in the attribution of dates, see Christopher Witcombe, "Sixtus V and the Scala Santa," *JSAH* 44, no. 4 (Dec. 1985): 368-79.

[24] "*m' è parso cosa conveniente con l'occasione del manifestare l'arte del trasportar la Guglia, descrivere ancora le fabriche farte.*" Domenico Fontana, *Della trasportatione*, fol. 3v; Sullivan, trans. (2002), 6.

[25] The full title of the work is "*Della trasportatione dell'obelisco Vaticano et delle fabriche di nostro signore papa Sisto V fatte dal Cavallier Domenico Fontana architetto di sua santita,* published by Domenico Basa, 1590. A second volume was published in Naples, 1604.

[26] Domenico Fontana's earliest biographical accounts appear in Giovanni Baglione, *Le vite de' pittori scultori et architetti* (Rome: Manelfi, 1649); Pietro Bellori, *Le vite de' pittori scultori e architetetti moderni* (Rome: Mascardi, 1672) and Francesco Milizia, *Memorie degli Architetti antichi e moderni, Tomo II*, 3rd ed. (Parma: Stamperia Reale, 1781), 80-97.

[27] Antonio Muñoz, *Domenico Fontana Architetto* (Rome: Cremonese Editore, 1944).

Figure 1.1 Title page and frontispiece. *Della Trasportatione dell'Obelisco Vaticano*. Digital facsimile of the work published in 1590, from the copy in the Library of Congress. Oakland: Octavo, 2002.

scholarship on late sixteenth-century architectural history still favours Sixtus, who is often identified as a visionary figurehead in urbanism and politics.[28] Consequently, it was easier to circumscribe Fontana's work within the context of engineering history.

The literature devoted to Fontana's Vatican obelisk project and its afterimage in the seventeenth century is an even narrower field of research.[29] The technical interpretation of the project formed my rationale for assessing the project's relevance to the history of architecture. Keeping this reevaluation in mind, the key to alternate readings exists in the illustrations of the project by Giovanni Guerra and Natale Bonifacio. The obelisk project played a central role in the publishing houses of the Sixtine papacy.[30] Bonifacio's other representations of the transportation of relics and maps of Roman pilgrimage routes in Rome during Sixtus V reign constitute a body of visual representations of movement. Sixtus V issued copyright privileges to several texts on Sixtine building projects, in addition to Guerra and Bonifacio's four remarkable prints that envision Fontana's project as stages of movement.[31] Fontana's book expressed sixteenth-century

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[28] Fontana scholar Sabina de Cavi has pointed out that the majority of Fontana scholarship is more precisely focused on Sixtus. See *Architecture and Royal Presence: Domenico and Giulio Cesare Fontana in Spanish Naples (1592-1627)* (Newcastle, UK: Cambridge Scholars Publishing, 2009).

[29] See The Library of Congress edition with English translation by David Sullivan and introductory essay by Ingrid Rowland. An English translation and digital copy of the text have dramatically increased its accessibility. Prior to this edition, the only appraisal of the book itself was the facsimile edition (with essays in Italian and abridged translations in English): *Della Trasportatione dell'obelisco Vaticano*, ed. Adriano Carugo with an introduction by Paolo Portoghesi (Milan: Edizioni il Polifilo, 1978).

[30] See Christopher L.C.E. Witcombe, *Copyright in the Renaissance: Prints and the Privilegio in Sixteenth-Century Venice and Rome* (Leiden: Brill, 2004) 141-147, and 272-82 for in-depth investigation of the Roman publisher of Fontana's text, Bartolomeo Grassi, the copyright granted to Natale Bonifacio, information on Sixtus V's issuance of papal *privilegi* and a section devoted to books on raising of the obelisk.

[31] Three of these monumental prints are reproduced in this dissertation (see Chapter 4, figs. 4.1, 4.2 and 4.15).

ideas of transportation and the temporal and cosmological dimensions of movement. An overview of Sixtus V's urban program will provide the necessary context for this investigation.

SIXTUS V'S ROME AND THE TRANSLATION OF RELICS

The procession to the Lateran to commemorate Sixtus V's possession of the episcopal seat of Rome was a solemn and sparse affair. On May 5, 1585, Sixtus V rode through the streets on horseback, his countenance notably "unmoved" and "stern".[32] In recalling the impression the pope left on the crowd, Ludwig von Pastor suggests: "When he raised his hand no one quite knew whether it was by way of menace or benediction."[33] Sixtus V was often described in this manner, as having a countenance that exuded an unequivocal, unyielding, and steadfast resolve, in clear contrast to his predecessor and rival Gregory XIII.

Although they had despised one another since their days as cardinals, their pontificates had considerable continuity.[34] Gregory XIII had been the first pope in decades to seriously consider proposals for the Vatican obelisk project. A Gregorian revival of pilgrimages to Rome was inaugurated in the Holy Year of 1575.[35] Under his leadership, urban renovations would include the development of new roads, expanded housing, and improved sanitation. Guidebooks to the city and its sacred sights proliferated as tens of thousands flocking to Rome for the Jubilee.

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[32] See Ludwig von Pastor, *The History of the Popes from the Close of the Middle Ages*, vol. 21, 75. Pastor describes Sixtus V as being feared by the populace.

[33] Ibid.

[34] Sixtus V maintained several members of Gregory's curia including Michele Mercati as papal physician.

[35] On the Jubilee and its impact on the Sixtine papacy see Philip Jacks, "A Sacred Meta for Pilgrims in the Holy Year 1575," *Architectura* 19, no. 2 (1989): 137-65; Nicola Courtright also explores the impact of Gregory XIII's pontificate on the physical fabric of Rome in *The Papacy and the Art of Reform in Sixteenth-Century Rome: Gregory XIII's Tower of the Winds in the Vatican* (Cambridge, UK: Cambridge University Press, 2003).

Pilgrimage, parades, stational liturgy, translocation of relics, and triumphal entries revitalized the city. By June 1580, the *traslatio* of the body of St. Gregory Nazianen to Saint Peter's became a landmark for Gregory XIII's public image and his association with Rome and its topography.[36] The procession of the saint's remains was saluted by artillery fire as it approached the Castel Sant'Angelo. These rituals were widely attended and recorded in various commemorative poems and works of art.

Despite being cast in opposition to Gregory XIII, Sixtus V's ecclesiastical vision was similarly indebted to his personal experience negotiating Rome's dense urban network of routes as a devout pilgrim. Fontana's text, for instance, connects his building activity with the city's image and wellbeing in the following passage:

> Thus, we may reasonably claim that if Pope Sixtus IV of holy memory obtained the name of Romulus for having improved and enlarged this city with various edifices, then Pope Sixtus V, both by reason of his many constructions as well as by reason of paternal care and singular providence with which he maintains the city of Rome […][37]

Sixtus anticipated how his urban plan best related to sixteenth-century Roman culture. His overhaul, including the connection of the hills of Rome to the historic city, the star-shaped plan anchored on Santa Maria Maggiore and his formation of piazzas and urban infrastructure,

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[36] For a discussion of how the translation of relics promoted a particular image of Gregory XIII and connected him to Rome and its topography see Courtright, *Papacy and the Art of Reform,* (2003) 20.

[37] Fontana, *Della trasportatione*, fol. 4v; Sullivan, trans., 8. The original passage reads as follows: "*Di modo che si per tante fabriche, si anco per la paterna cura, e singular providenza, con la quale questo sommo Pontefice mantiene e la Città Di Roma, e tutto lo stato Ecclesiastico abondante di vettovaglie, libero da gli Assassini, e perturbatori della publica quiete, potiamo ragionevolmente affermare, che se Sisto Papa Quarto santa memoria ottenne il nome di Romolo per haver migliorato, e accresciuto questa Città di vari edifice, cosi nostro Signore Sisto Quinto con tante imprese d'Architettura con tanta pace, e tranquillità dello stato della Chiesa, con haver radunato tanti tesori publici, e con la giustitia, che ministra, merita il titolo non solamente d'Augusto: ma di commun consenso merita anco esser chiamato Padre della Patria*."

reflects an acute understanding of the present and future needs underscored by a staunch agenda of Orthodox Reform.[38] Sixtus's agenda emerges as a project for the Christianizing of Rome's monuments: exorcisms, consecrations, demolitions and restorations are the same brand of action.

In his manifesto for modernist architecture and urban planning, *Space, Time and Architecture*, Sigfried Gideon argued that Sixtus wanted to open the streets for devotional functions and to link the desolate parts of the city to the internal fabric with more coherence. He concluded that Sixtus did not develop a paper plan but, rather, one that was "in his bones."[39] As one of Rome's devout Christians, Sixtus based his plan on a real experience. The obelisks are used to redefine the space of the square and are evidence of both Fontana's and Sixtus V's skill for recognizing the organic complexity of the city. Devotion to the translocation of relics, chapels and obelisks, are practices related to the building program of the Sixtine pontificate.

There is extensive literature that focuses on the Sixtine obelisks as nodal points in a visually seductive map of Baroque Rome. In this treatment of Sixtine urbanism, the obelisks serve the termination of perspectival views. By retracing the existing processional routes, a real value system could now be attributed to the city's form and arrangement. As the inventor of the technical scheme to perform this transformation, Domenico Fontana offers this important reconsideration of the spatial city.[40] These are all very compelling interpretations of the Baroque city that argue for the value of Sixtus V's plan on modern urbanism and dismiss its meanings for architecture. Where I think there is still something worth looking at here is the gap between the

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[38] Ludwig von Pastor, *The History of the Popes*, vol. 22.

[39] Sigfried Giedion, "Sixtus V (1585-1590) and the Planning of Baroque Rome," in *Space, Time and Architecture: The Growth of a New Tradition*. 5th ed. (Cambridge, MA: Harvard University Press, 1967).

[40] Paolo Portoghesi's assessment is an example of this tendency in the scholarship on obelisks and Sixtine urbanism. See *Roma Barocca: The History of an Architectonic Culture*, trans. Barbara Luigia La Penta (Cambridge, MA: MIT Press, 1970).

hypertrophic treatment of Fontana's technical and engineering status and the focus on the obelisk's effects after the transportation as part of a new way of experiencing the city.

The focus on Sixtine building constitutes a vast field of scholarship that has wide implications for Baroque urbanism.[41] There are a few studies that have looked at the experiential potential of the obelisks in the urban topography of Rome. For instance, Richard Sennett's *Conscience of the Eye* describes the obelisks as a mode of ethical vision in how they orient the visitor around the city and allow for a sensorial experience of the city. Others, such as Charles Burroughs, have debated how the Sixtine plan of Rome should be regarded — noting the modernist biases of interpretations like Giedion's modernism or Foucauldian analyses based on a theory of panopticism.[42] Such studies look at the pope's intentions and how they reflected his political and religious ambitions and militancy.

Transporting St. Peter's obelisk was the first move in Sixtus V's urban plan for obelisks. Sixtine building initiatives and the erection of the four obelisks were part of the pope's proselytizing efforts to bring religion to Romans via its urban topography. Accentuating the processional routes thus brought new life to the liturgical feasts, which had lost their importance in areas outside of the Vatican since Avignon.[43] The obelisks served a liturgical function that united the entire city under the sanctity of Christian ritual. Following the straightening of the

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[41] Key Italian sources on Sixtine urbanism include, Giorgio Simoncini, *Topografia e urbanistica da Giulio II a Clemente VIII*, vol. 1 of *Roma: Le trasformazioni urbane nel cinquecento* (Florence: Leo S. Olschki, 2008); and Maria Piera Sette, ed., *Architetture per la città* (Rome: Multigrafica Editore, 1992).

[42] Original studies on the aftermath of Sixtus V's urban plan include Richard Sennett, *The Conscience of the Eye: The Design and Social Life of Cities* (New York: Knopf, 1990) and Charles Burroughs, "Opacity and Transparence: Networks and Enclaves in the Rome of Sixtus V," *RES: Anthropology and Aesthetics*, n. 41 (Spring, 2002): 56-71.

[43] Helge Gamrath, *Roma Sancta Renovata Studi sull'urbanistica di Roma nella seconda metà del sec. XVI con particolare riferimento al pontificato di Sisto V* (1585-1590) (Rome: L'Erma di Bretschneider, 1987).

Vatican obelisk in 1586, Fontana set to work on the obelisk that had been recovered in the Via Ripetta, (referred to thereafter as the Esquiline obelisk), and had it moved to the square to the rear of Santa Maria Maggiore.[44] In 1588, he erected the largest of the Sixtine *spolia*, the Lateran obelisk (recovered from the Via Gregoriana).[45] The last of the obelisks to be completed by Fontana was the Flaminian in the Piazza del Popolo in 1589. Later in this chapter I will elaborate on the discussion of these obelisks and their history (and how Fontana writes about them in his book). Each had its own history and characteristics (varying in scale, weight, the presence of hieroglyphs, inscriptions, how they were found, etc.). Once they were erected, they were brought into a single system using insignia of the pope and the image of the cross.

> Moreover, for the greater glory and splendor of this sacred Christian standard, [Sixtus V] ordered that it should be placed on all of his important buildings, that is on the other needles, at Santa Maria Maggiore, at St. John Lateran, at Santa Maria del Popolo, above the Chapel of the Manger, over the Quirinal Gate, above the Fonte Felice, above his Holiness' palace on Monte Cavallo, above the Campidoglio and elsewhere, and in other buildings that were constantly being constructed. Thence, with such high esteem and honors paid to the most holy cross, aside from the ornaments that these marvelous obelisks bring to the churches and places where they are erected, which are thus made more famous, there will remain in future ages a clear and everlasting testimony of the piety and devotion which this most Holy Father, our shepherd, has especially for the most holy cross.[46]

In regards to the method of their transportation, Fontana used the same machinery that he designed and constructed for the first of the transfers – the Vatican obelisk. Although the staging of the other obelisks is not documented in the process of movement as with the Vaticanus – there are brief descriptions of the specifics of these transportations, and representations of the restored

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[44] Erik Iversen, *The Obelisks of Rome*, vol. 1 of *Obelisks in Exile* (Copenhagen: Gad, 1968), 50.

[45] Ibid, 63-4.

[46] Fontana's description of the proselytizing effect of the Sixtine building program appears in the letter to the reader, fols. 3r-3v; Sullivan, trans., 5.

and erected monuments.[47] The consistent and methodical reuse of the same program, from the motivations, to the iconography, to the technical method of its implementation and then to restage the event with different obelisks and relics, shows that there is a manifold meaning in the obelisk's transfer. Fontana's method for transporting and converting obelisks was used to move an ancient relic – in this case to preserve its sanctity.

The Transportation of the Old Chapel of the Manger (1587)

One of Sixtus V's personal devotions was to the miraculous transportation of the Holy House of the Virgin, one of the most revered pilgrimage sites of the late sixteenth century, and reproduced in Catholic shrines across the world, most notably in Prague. According to legend, angels raised the house (originally sited near Ephesus) across the Adriatic to the hillside town of Loreto to save it from destruction by the Turks. In iconography, the House appears most commonly as a canopied structure borne on the shoulders of angels sheltering the seated figure of Mary. The floating relic established a model for later representations of transportable sacred architecture, which flourished in Christianity after the late fourteenth century (fig. 1.2).[48] The mythic transportation would continue to proliferate in devotional prints of the sixteenth century. One of these engravings by Natale Bonifacio (1573) delineates the trajectory of the flying house through every stop and obstacle on its journey over cities, mountains, and seas. In comparison, earlier manuscript illuminations of the Virgin's house-in-flight read more abstractly as an icon

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[47] The Lateran (St. John Lateran) appears in *Della trasportatione*, fol. 70v; the Flaminian obelisk (Santa Maria del Popolo) appears on fol. 75r and the Esquiline obelisk (Santa Maria Maggiore), fol. 76r.

[48] On the Santa Casa and its image see Alexander Nagel and Christopher S. Wood, "Movable Building," in *The Anachronic Renaissance* (New York: Zone Books, 2010), 195- 217.

Figure 1.2 The translation of the house of the Virgin. Carlo Francesco, *Iter Lauretanae domus, sive Pax castra movens,* 1661.

rather than this physical terrain.[49] Loreto was one of the towns favoured by Sixtus in his public works campaign. By this time, the imagery of the Loretan cult had established itself as the feature of the papacy's central relics. Its presence in Sixtus V's works also testifies to the increasing understanding of *trasportatione*/*traslatio* in a web of ritual, metaphysical, devotional and cosmological beliefs and practices.

Just prior to becoming Sixtus V in the conclave of April 1585, Cardinal Felice Peretti di Montalto began constructing a new family chapel at the north end of Santa Maria Maggiore.[50] The most important of the Marian basilicas in Rome, the church was a long-venerated pilgrimage site and locale for stational liturgy. His Esquiline villa was built on axis with the basilica from where he delivered mass every Christmas. Fontana designed the new Sixtine chapel to hold the tomb of Pius V, the shrines of the saints Jerome and Lucy, and relics from the birth of Christ. The construction of a new facility demanded the repositioning of the ancient oratory of the *Presepio,* which was built off the northeast aisle of Santa Maria Maggiore during the early medieval period (although scholars do not agree on its earliest construction date).[51] The chapel and its holy contents, which included a lead chest reliquary containing the remnants of Christ's manger (literally a representation of a grotto and the crib of Christ), were an integral part of the

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[49] For a discussion of the sixteenth-century iconography of the Holy House of the Virgin and its transportation see Adrianne Hamilton, "Translating the Sacred: Piety, Politics and the Changing Image of the Holy House of Loreto" (Master's thesis, University of Oregon., 2008), 14-21.

[50] Fontana states in "The Description of the Construction of the Chapel of the Manger" that the process had begun three months before Felice Peretti's ascension to the pontificate January 14, 1585. *Della trasportatione*, fol. 39r; and Sullivan, trans., 45.

[51] For scholarship devoted to the Sistine Chapel at Santa Maria Maggiore, and its liturgical and devotional program, see Steven Ostrow, "The Sistine Chapel at S. Maria Maggiore: Sixtus V and the Art of the Counter Reformaton" PhD diss., Princeton University, 1987 and *Art and Spirituality in Counter-Reformation Rome* (Cambridge, UK: Cambridge University Press, 1996).

basilica's history and another object of the pope's personal devotion. Although the basilica's canons granted permission for its demolition, as long as Fontana preserved and rehoused the relics, Sixtus opted to preserve the structure in its entirety. He instructed Fontana to move the edifice ten palms and lower it into an excavated space in the floor. Once interred, it would be crowned with a pristine marble altar, creating a focal point for the delivery of the Christmas liturgies. Fontana's newly constructed chapel became the stronghold for the operation.

Before its translocation in 1586, the *Presepio* chapel was an enclosed, structurally independent vaulted space with a rectangular plan (3.4m x 2.5m). In keeping with its liturgical function, its appearance was a quotation of the grotto in Bethlehem where, according to the Scriptures, Christ had been born. Along with an altar, it housed Nativity relics from the Holy Land, including five pieces of wood from the Crib of Christ and swaddling clothes. Fontana was charged with moving the chapel "intact," approximately 53 metres, to the centre of the new plan. *Della trasportatione* offers an account of the "method of transport" with several drawings of the new chapel's design and the translocation (fig. 1.3).[52] The oratory was encased in a wooden framework before being placed on rollers. Two windlasses maneuvered the chapel to an opening in the floor. It was stationed on a platform of beams over the opening before being lowered by six windlasses on to its new foundation. The workers tightened the ropes so that the beams could be removed and the chapel could be suspended in the air. To make the necessary adjustments, they slackened them until the chapel was placed on its foundations. The arrangement of the machinery and the elevations of the old chapel during transport are illustrated in *Della trasportatione*.[53]

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[52] Fontana, *Della trasportatione*, fols. 50r-50v.
[53] Fontana, *Della trasportatione,* plate 51r.

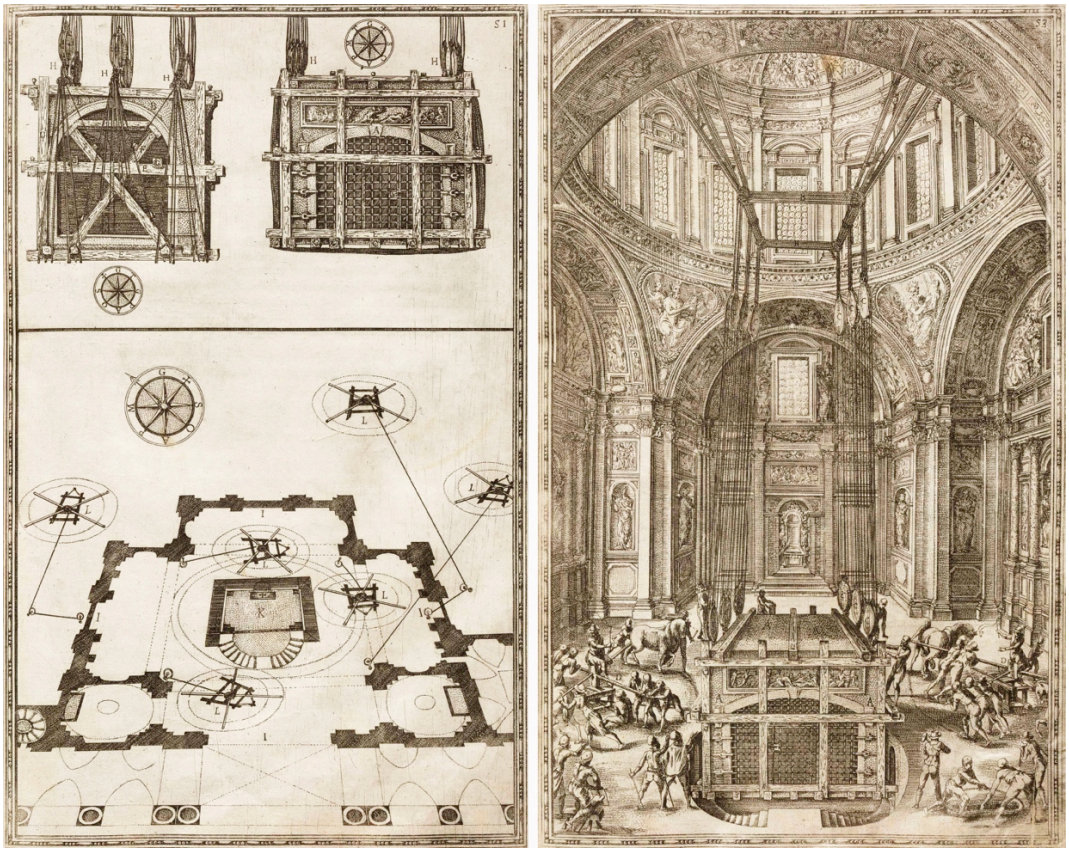

Figure 1.3 Transportation of the Chapel of the Manger, fols. 51r and 53r. *Della Trasportatione dell'Obelisco Vaticano*. Digital facsimile from the copy in the Library of Congress. Oakland: Octavo, 2002.

Once the ancient oratory was lowered into place, it became the base for a new altar, with the Tabernacle of the Sacrament placed above. A stairway on either side encircled the sunken chapel. Pilgrims would descend into the subterranean cavern to enter the ancient chapel and circumnavigate its ambulatory. The passageway contained niches housing figures from the Nativity. Sixteenth-century literature on the cult of relics suggests that re-consecrated sites such as the Nativity at Santa Maggiore rebuilt the sanctity of the site for worshippers.[54] The ancient Chapel of the Manger is drawn into the present, whereby Fontana can claim to have performed such "a successful undertaking that it seems as through this chapel had been built in the same place where it is seen today."[55]

The Image of Sixtus V and the Renewal of Christian Rome

At the outset of his pontificate, Sixtus V initiated a civil project to bring water to the Quirinal. Also known as Monte Cavallo, the Quirinal was the highest of Rome's principal hills and the site of prominent villas and gardens that lacked access to water. Although Gregory XIII first proposed the idea of an aqueduct in 1575, Sixtus V would successfully raise the funds and manage the complex administration to realize the accomplishment. The transformation of Monte Cavallo and the other hills of Rome invited comparisons to the invocation of water from stone by Moses to save his people. In Fontana's estimation, the miraculous invocation of a "perpetual

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[54] Stephen Ostrow has argued that in this context, 'transportation' refers not only to the movement of the relics, but also to the elevation of the spirit of the faithful. He argues that this experience is a result of the conditions of the Presepio (i.e. that it is underground, that it contains relics, and that it happens at Christmas, with the liturgical mass, the candles, the singing, and the statues. This recreation of the Nativity transports the pilgrim to another time and place. See "The Sistine Chapel as Franciscan Shrine," in Ostrow, *Art and Sprituality* (1996), 5-62.

[55] Fontana, *Della trasportatione*, fol. 52v; Sullivan, trans., 53.

springtime" would be the catalyst for "a new Rome.[56] The aqueduct was christened in honour of the pope's given name Felice and was henceforth identified with Sixtine heraldry. An inscription cited by Fontana in *Della trasportatione* describes the replenishment of the land:

> As dry Egypt is flooded by the pooling water of Nile
> When the Sun stands in the sign of the starry Lion,
> Thus too, as the great-spirited Lion regulates the land,
> Arid Rome flows again with the joyful waters of Felix.[57]

The text accompanies a fresco commemorating Sixtine public works in the *Salone dei Papi* at the Lateran Palace. The *Aqua Felice* moved waters thirty-three kilometres, from their source on the property of Duke Mauruzio Colonna of Zagarola, along a tortuous path across the countryside toward the Piazza Santa Susanna atop the Quirinal. The system was constructed in a mere eighteen months under the steady labour of several thousand workers (as many as four thousand at the most demanding stages and no less than two thousand over the entire construction period).[58]

It meant building new infrastructure and elevated arches for the artificial waterways. Fontana explains that it was "often crucial to cut down hills full of stones and flint" in order to reduce the depth of the subterranean extent of the conduit.[59] Enough excavation, leveling and traversal over the land to conduct water over the hilly terrain substantially altered the topography of Rome. As the conduits made their way to the city's boundaries, they were marked with portals.[60] Gateways like the Porta Furba and Porta S. Lorenzo also marked the passageway of

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[56] Fontana writes that when the pope "gave this water" to the inhabitants of Rome, "It [was] so to speak, a new Rome." *Della trasportatione,* fol. 54v; Sullivan, trans. 54.

[57] The inscription from the Aqua Felice is in Fontana, fol. 60v; Sullivan, trans., 61.

[58] Fontana, fol. 54r; Sullivan, trans., 54.

[59] Ibid.

[60] Pastor, v. 22, 208.

pilgrims, dignitaries and triumphal processions moving in and out of the city. An inscription on one of these arches, located outside of the city's boundaries at Monte del Grano reminded the traveller that Sixtus V "commanded that waters should be sought for in all directions, so that, restoring the fountains, the deserted hills of the city should once again be inhabited."[61]

After traversing the Quirinal ridge, the conduits terminated at a *mostra* fountain designed by Fontana in the Piazza S. Susanna (now the Piazza Barbero). Although its centerpiece—a Moses sculpture by Prospero Bresciano—was famously rejected by contemporary critics for its poor proportions and execution, the fountain marks the journey of water over the countryside, above and below ground, and creating an artificial terrain.[62] In the guise of a temple façade, the structure actually screens the aqueduct's water distribution basin (*castello*). The façade is articulated with an Ionic order in tripartite arrangement with statuary niches containing the controversial Moses figure flanked by Joshua and Aaron (fig 1.4). In the emblematic tradition, Moses was both the allegory for the founding of Rome and a potent alchemical symbol.

The mixing of symbols of "dry" Egypt, the flooding Nile, the constellation of Leo and the Sun (even offhandedly) sustains the ambiguity of the emblematic tradition.[63] Sixtus V's views on post-Tridentine reform were widely understood to have been motivated by an extreme form of Catholic orthodoxy. The presence of these symbols was a sign of the way that the emblematic tradition seeped into the prevailing visual culture of the church. But beneath the religious

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[61] Fontana, fol. 54v; Sullivan, trans., 54.

[62] For the reception of the statue of Moses see Steven F. Ostrow, "The Discourse of Failure in Seventeenth-Century Rome: Prospero Bresciano's 'Moses'," *Art Bulletin* 88, no.2 (2006): 267-91.

[63] In *A Dictionary of Alchemical Imagery*, Lyndy Abraham underscores the tendency in alchemical texts to propagate new and sometimes contradictory forms. This image making parallels the instability of the alchemical process itself (Cambridge, UK: Cambridge University Press, 1998), xviii.

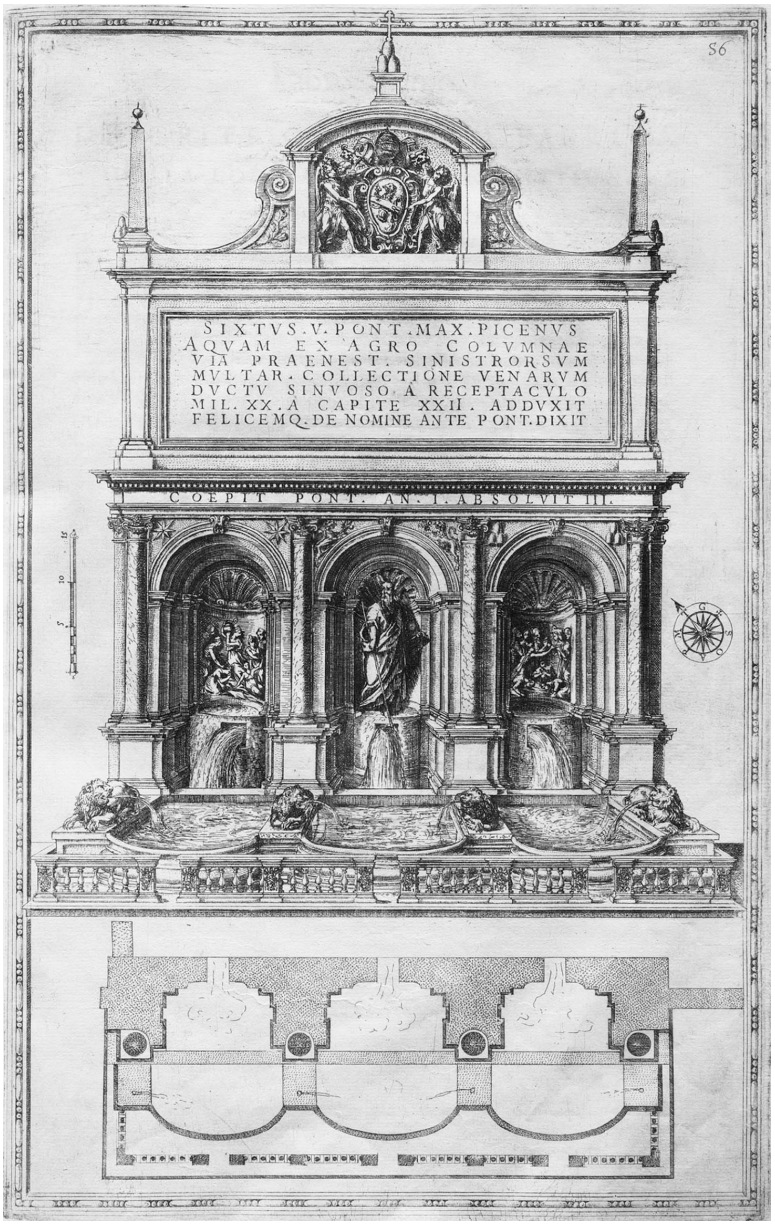

Figure 1.4 Drawing of the *mostra* fountain of the Aqua Felice, fol. 56r. *Della Trasportatione dell'Obelisco Vaticano*. Digital facsimile from the copy in the Library of Congress. Oakland: Octavo, 2002.

narrative an undercurrent of alchemy conflated the ancient art of hydraulics with the sacred rituals of expurgation and translocation.

MICHELE MERCATI AND THE OBELISKS OF ROME (1589)

Michele Mercati (b. San Miniato 1541-1593) produced the first history of Roman obelisks, chronicling their Egyptian origins, their presence in the imperial circuses, and their exaltation during the Sixtine pontificate (1585-1590).[64] Mercati's compendium, *Gli obelischi di Roma* and published by Domenico Basa in 1589, would commemorate the pope's effort to "expunge heresy and to extinguish the detestable memory of Idolatry"[65] by documenting the *spolia* of Egypt and providing a historiography of their delivery (fig. 1.5).[66] In forty-four chapters, Mercati assembled an erudite genealogy illustrating how hieroglyphic figures preceded the emblematic tradition of his own time.[67] This last section of the chapter presents Mercati's approach to the study of Egyptian antiquities and natural objects. My contention is that Mercati's approach to the Vatican obelisk project – told through the origins of the obelisks, a cataloguing of their physical characteristics, and an exhaustive account of their transformation—was informed by his approach to the acquisition of knowledge. The account of the obelisks in

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[64] Studies on monuments and hieroglyphs that were thought to be Egyptian were widespread in the fifteenth century. Mercati's book is the first history that focuses exclusively on the lineage of the obelisks that were transported to Rome. His work follows the Plinian model of natural history and in turn becomes the model for twentieth-century biographies of obelisks such as Cesare D'Onofrio's *Gli obelischi di Roma* and Erik Iversen's *The Obelisks of Rome*, vol. 1 of *Obelisks in Exile* (1968).

[65] Mercati, *De gli obelischi di Roma* (1589), 4.

[66] Mercati drafted his work on the obelisks in Poland while accompanying his patron Ippolito Aldobrandi (future Clement VIII) on an apostolic mission from 1588-1589.

[67] See Erik Iversen in *The Myth of Egypt and its Hieroglyphs in European Tradition* (Copenhagen: Gad, 1961). Iversen claims that although Mercati was not groundbreaking in his attempt to decode the hieroglyphs, at the very least he recognized a separation between the Renaissance emblematic tradition and Egyptian hieroglyphs.


DE
GLI OBELISCHI
DI ROMA.
DI MONSIG. MICHELE MERCATI
PROTONOT. APOSTOLICO.
ALLA SANTITA'
DI N. S. SISTO QVINTO
PONTEFICE MASSIMO.
IN ROMA,
Appresso Domenico Basa. M. D. LXXXIX.
CON LICENTIA DE' SVPERIORI.

Figure 1.5 Michele Mercati, frontispiece, *De gli obelischi di Roma.* Rome: Domenico Basa, 1589.

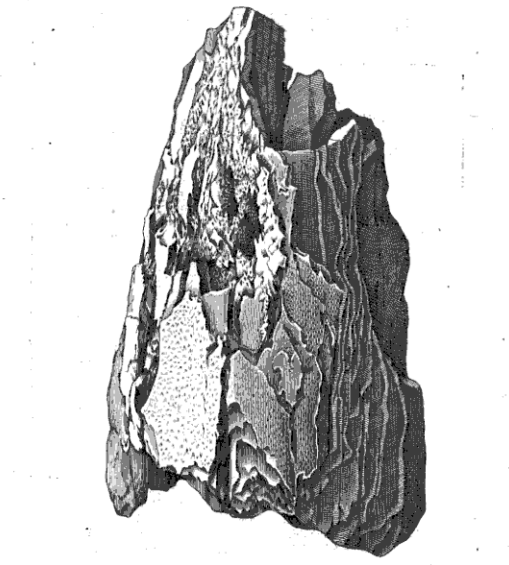

Figure 1.6 Engraving from Michele Mercati, *Metallotheca*. Rome: 1717, p.279.

Mercati's book does not focus on a glorification of mechanical knowledge (although it does provide a brief overview of Fontana's method). Its character is instead best measured against a Plinian model for the study of natural history and a fascination with etymology and origins. As we move ahead in subsequent chapters, examining texts on mechanics and movement that surround Fontana's project – Mercati's work has a distinct role. On the one hand it provides the project's genealogical history. It shows a serious treatment of each of the obelisks, with particular concerns for their original sites, translocations, Egyptian symbolism, their physical characteristics as stones, and their final state once erected. Obelisks in Mercati's estimation become very complex entities with a profound role to play in humanist and hermetic culture.

Mercati has largely remained a peripheral figure in scholarship on sixteenth-century natural science, the history of collections, and antiquarianism.[68] He is usually mentioned in discussions of Renaissance natural science as Andrea Cesalpino's student and protégé and, elsewhere, as a forerunner to Athanasius Kircher's writings on obelisks and hieroglyphs.[69] Having studied medicine at Pisa, Mercati came to Rome in 1561 during the pontificate of Pius V. His first opus, *L'instruttione sopra la peste*, probed the effects of pestilence on the body in the hope of finding an effective treatment (1576).[70] Outside of his firsthand account of the moving of the obelisk, he is most renowned for his geological museum the *Metallotheca*, a vast collection

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[68] For an overview of Michele Michele's work on obelisks, the plague and his geological museum see Gianfranco Cantelli, "Introduction," *Gli obelischi a Roma* (1981); and Bruno Accordi, "Michele Mercati (1541-1593) e la Metallotheca," *Geologica Romana* 19 (1980): 1-50, and L. Permuda, "Michele Mercati," *Dictionary of Scientific Biography*, 308-9. For Mercati's relationship to other naturalists and collectors in the sixteenth century see Paula Findlen, *Possessing Nature: Museums, Collecting and Scientific Culture in Early Modern Italy* (Berkley: University of California Press, 1994).

[69] Paula Findlen's work on Athanasius Kircher has brought Mercati's place in the collecting culture of the sixteenth-century into the foreground.

[70] Mercati was working as a physician on the plague during the outbreak of 1575-77.

of shells, corals, bones, minerals, and rocks, which was published, posthumously, as a book in 1717.[71]

Mercati On The Egyptian Origins of the Obelisks

Like his fellow physicians, Mercati's commitment to the revival of ancient authorities, especially that of Pliny the Elder and Aristotle, is evident in his catalogue of the natural world, the *Metallotheca*. In both its physical manifestation as a cabinet of curiosities, and its visual representation as a book, the *Metallotheca* uses a comparative method to evaluate material similarities and differences and to deduce origins.[72] Objects were grouped together according to their material similarities and differences (fig. 1.6).[73] Similarly, Mercati's work on obelisks proposes a genealogical table to trace their lineage, from their pharaonic provenance to their transformation under the papacy. The fascination with etymological inquiry, characteristic of natural philosophy during the Renaissance, would leave no stone unturned. In *De gli obelischi* Mercati informs his reader that the Egyptian term for obelisk referenced the rays of the sun. Although the shape of the obelisk is simple, Mercati elaborates in his exposition, skill is evident

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[71] Monsignor Lancisi published the text with its 127 original copper engravings by Anton Eisenhout. For the *Metallotheca*'s history and how its sixteenth-century ideas were interpreted in the eighteenth century when it was finally published, see Alix Cooper, "The Museum and the Book: The *Metallotheca* and the History of an Encyclopaedic Natural History in Early Modern Italy," *Journal of the History of Collections* 7, no.1 (1995): 1-23. Lancisi commented later that Mercati met a most appropriate end, in that his own body became an *armadio* or cabinet for stones.

[72] On the importance of etymology and genealogy in the Renaissance, see Frank L. Borchardt, "Etymology in Tradition and in the Northern Renaissance" *Journal of the History of Ideas*, 29, no. 3 (July–Sept. 1968): 415-429 and Marian Rothstein, "Etymology, Genealogy, and the Immutability of Origins" in *Renaissance Quarterly* 43:2 (Summer, 1990): 332-347. Paula Findlen has studied the specific language of collecting in this period and how it relates to etymology in *Possessing Nature* (1994), esp. 48.

[73] I am not the first to draw a link between Mercati's *De gli obelischi* and his natural collections. Alix Cooper has described Mercati as participating fully in the sixteenth-century naturalists' "revaluation of objects", which includes obelisks (1995), 3.

in the way that the form is cut.[74] In Greek, he writes, they were called *obeli*, after their spear-like form. Modern usage of the vulgate term, *guglia,* for the Vaticanus originated from the belief that the orb at its summit contained the ashes of Julius Caesar. An inscription on the obelisk's base, referencing "Divine Julius," may have reinforced that attribution along with a passage in Seutonius' *Life of Caesar* that cited a funerary monument of Numidian marble dedicated to him.[75] Mercati credits Fontana with debunking this myth, when he extracted the sphere to expose its actual contents.[76] Instead, he pursues the alternate terms *guglia* through the homonym *aguglia,* derived from 'needle'.[77] In the case of the Vatican obelisk, its name is transformed from the Obelisk of Caius to the Obelisk of Saint Peter.[78]

As the focus of intense debate at the beginning of the Quattrocento concerning sacred writing and imagery, Egyptian monuments and hieroglyphs would continue to sustain the humanist preoccupation in origins in the Renaissance.[79] Mercati's foray into this narrative follows the transmission of sacred knowledge from Hermes Trismegistus and his disciple Asclepius to Plato and the Christian Neoplatonists.[80] The hermetic reading of Egyptian arts, letters, music, astronomy, astrology, and practical magic is largely indebted to revivalists of the

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[74] Mercati, "Chapter 1, On the Form and Naming of the Obelisks", *Obelischi* (1981), 43.

[75] Fontana references the inscription in a plate that shows the obelisk in its original site, fol 8r. The connection to the funerary monument in Seutonius' *Life of Caesa*r appears in D'Onofrio (1992), and Curran, *The Egyptian Renaissance* (2007), 39.

[76] Fontana, Pigafetta and Mercati all write about this important discovery. It has been seen as a precedent for modern archaeological techniques.

[77] For a discussion of the Vatican obelisk's origins and the interpretations of its naming in Renaissance literature see Curran, *The Egyptian Renaissance* (2007), esp. 37-39.

[78] In *De gli obelischi*, the "Obelisk of Saint Peter" is devoted a different chapter than the Obelisk of Caius even though they are the same monument.

[79] See Jacks, *The Antiquarian and the Myth of Antiquity* (1993), esp. 7-8.

[80] This narrative begins with the invention of divine knowledge in Mercati, Chapter 5 "The sciences that flourished below the Egyptians inventors of the obelisks", *Obelischi* (1981).

Hermetica, such as Lactantius, Augustine and Marsilio Ficino.[81] The resulting genealogy describes the conversion of the Egyptian monuments as objects of sun worship to the instruments of the Roman emperors and popes. The obelisks, Mercati reminds us, crafted as sacred symbols of cosmic harmony, were hewn from the earth and eventually enlisted to serve a symbolic regime under the Church.[82] Over several chapters, Mercati recreates the genealogy of wisdom and letters in the Egyptian tradition with Hermes Trismegistus and his disciple Asclepius, the inventor of medicine.

Similarly, Mercati understood the vital role of hieroglyphs in Renaissance iconography. In his philology of sacred images, Egyptian hieroglyphs should be interpreted as repositories for divinely coded messages instead of precursors of written script. As the fourteenth-century 'discovery' of the *Hermetica* represented the unearthing of ancient wisdom, so too did the excavation of obelisks. By deploying the term "ruin" in describing the transfer from Egypt to Rome, Mercati suggests a disruption and subsequent realignment via their raising. After their "second ruin" by the barbarians, the obelisks were not to be re-erected until the new age of Sixtus V.[83]

As a hermetic scholar and Egypt-enthusiast, Mercati was versed in the convergence of philosophical, alchemical, medical and theological metaphors in humanist literature. Allusions to the "transmutation" of the obelisk are not abundant in *De gli obelischi* but are nevertheless present. His dedication emphasized the pontiff's intentions to use the obelisks as models of

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[81] Incidentally Mercati's grandfather, also a physician named Michele, was a close friend of Marsilio Ficino.

[82] Mercati describes the hubris of the Egyptian priests for straying from the teachings of Mercury Trismegistus and worshipping the monuments as pagan idols. In Mercati's words, no one knew these noble sciences before the Egyptians. Mercati (1589), V, 61-2.

[83] Mercati, "On the New Erection of the Obelisks," *Gli obelischi di Roma* (1981), 293-5.

artifacts that had been altered according to the aims of the Catholic Church. The ritual involving the stone included its transportation (the procession), its consecration by surmounting it with the symbol of the cross, and its exaltation (before an altar).

Ostensibly, Sixtus V appears to be the least likely to harbour a passion for Egyptian relics. His papal bull, the *Coeli et terrae creator Deus*, condemning divination and astral magic, was generally cited as definitive proof of his orthodox disapproval of the occult.[84] However, one of the most evocative images in *Della trasportatione, Plate 75 bis*, reveals his contradictory attitude to hermetic symbolism and magic (fig. 1.7). It features two urban projects that underscore his official directive: to transform and convert the material of pagan idolatry into the "support and footstool" for the Cross.[85] In this drawing, the Flaminian obelisk (moved by Domenico Fontana to the Piazza del Popolo in 1587) surmounted with papal arms and bronze-gilt Cross, carries the same iconography as all four of Sixtus V's transported obelisks. They present a hierarchy of emblems, starting with the origins of the Egyptian hieroglyphs, the authoritative Roman imperial inscriptions on the base and the Christian papal iconography at the summit. Flanking the obelisk, the triumphal columns of Antoninus and Trajan appear as the foundation for monumental bronze statues of Peter and Paul, the vicars of Christ. Angels standing on winged orbs carry a banner with the words of the evangelist Luke: "He put the

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[84] These broad-stroke characterizations of the pope and his public abhorrence for paganism, antiquity, and the occult, have become the topic of scholarly reevaluation. Art historian Corinne Mandel studied the use of alchemical symbols in Sixtine imagery in *Sixtus V and the Lateran Palace* (Rome: Istituto Poligrafico e Zecca dello Stato, 1994). More recently, in Brian Curran et. al., *Obelisk a History* (2009), the authors have begun to unravel Sixtus V's reputation as eradicator of Rome's ancient past, and to go beyond the obvious reasons for his appropriation of the obelisk as the predominant symbol for his renewed Christian city.

[85] Fontana, *Della trasportatione*, plate 75bis.

mighty down from their seat, and raised the lowly on high [Luke 1:52]".[86] A central panel offers a dedication to the "Thrice-Great Most Blessed Father" by "his most humble and obliged servant" Domenico Fontana. As the founder of alchemy and hermetic knowledge, Hermes Trismegistus was called “thrice-great” because he embodied the facets of philosopher, king and priest, thereby possessing an all-encompassing wisdom.[87] The panegyric conflates Sixtus V's persona with the origins of occult knowledge and other pre-figurations of Christ in the form of Apollo, Mercury, Hermes and Moses. These hermetic messages would reappear in the allegorical and emblematic motifs at the Vatican, Villa Montalto and the Lateran Palace.

The iconography of Felice Peretti's papal arms supports this hermetic reading. Several recurrent alchemical motifs surface in his *stemma* such as the triple-mountain form and a lion bearing the branch of a pear tree. The form of the mountain (as two egg-like forms crowned by a third) alludes to the papal coronation but is also an allusion to Rome's seven hills and Sixtus V's birthplace in the mountain village of Montalto.[88] Alchemical metaphor suited the papal theme of Rome's triumphant transformation. The pope's origin story was heavily embellished with allusions to a magical and predestined metamorphosis from a wayward boy, named Critinus, to Apollo's solar element, having risen unscathed from the plague. The motif of the triple mountain is repeated throughout Sixtine frescoes including two versions of the *Prohibition of the Adulterers*, one at the Sixtine Staircase and another in the Salone Sistino at the Vatican library.

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[86] Fontana, *Della trasportatione*, plate 75bis; and trans. Sullivan, 77.

[87] Frances Yates, *Giordano Bruno and the Hermetic Tradition* (Chicago: Chicago University Press, 1964), 1-19.

[88] The reading of alchemical iconography and papal heraldry is derived from Corinne Mandel’s article, “Felix Culpa and Felix Roma: On The Program of the Sixtine Staircase at the Vatican,” *Art Bulletin* 75, no. 1 (March, 1993), 70; and Mandel, “’Starry Leo’, the Sun, and the Astrological Foundations of Sixtine Rome,” in *Canadian Art Review* 17, no.1 (1990): 17-39, esp. 20-32. Mandel looks at Sixtus V’s electoral charts and how his iconographic program has largely been misinterpreted as being devoid of hermetic references.

Sixtine heraldry atop each obelisk, translated the papal image across Rome's topography. The translation of the *presepe*, the birthplace of Christ also had close associations with the origin story crafted by Sixtus V. The fresco, produced by Giovanni Guerra in the Salone Sisto, echoes the motif of three mountains of the Sixtine *impresa* and holds the chapel of the manger (in the act of being transported) within its cavernous centre (fig. 1.8).[89]

In his geneaological study, Mercati classified the obelisks of Rome by their qualities, including their state during their transportation. The chapter "On the differences of the obelisks" considers the essential differences of the stones: their size, proportion, and their hieroglyphs (and whether or not these inscriptions should be referred to as "signs, or more accurately as letters."[90] Since the catalogued obelisks are more or less uniform in material—all made of red granite —in subsequent chapters, Mercati is increasingly preoccupied with the marks of their transportation by emphasizing their fissures, veins, and scars.[91]

Unable to locally procure such large pieces of stone, the Roman conquerors expropriated theirs from Egypt by sea on great barges, which were celebrated as marvels themselves. [92] Mercati contends that the Egyptians, who invented the obelisks and used them for divine worship, had not mastered how to use them spatially. The Romans affixed a bronze orb to apex of the pyramidion, to balance the shaft's proportions. The new arrangement was ideal for its place at the center of Roman circuses.[93] Mercati also privileged the Roman *gnoccoli,* or

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[89] Corinne Mandel has identified the triple-mountain motif as an alchemical symbol that references the philosopher's stone. See "Felix Culpa and Felix Roma," (1993), 85.

[90] Mercati, *De gli obelischi* (1589), 77.

[91] Mercati deals with this question in Chapter 8 "For what reasons the obelisks were only made of red granite and not another material."

[92] Mercati, *De gli obelischi* (1981), 227.

[93] Mercati compares the approaches to ornament by the Egyptians and the Romans in reference to the bronze sphere and the *gnoccoli*, see Mercati (1981), 234-235.

"dumplings," to raise the stone above the pedestal in defiance of its weight. Despite altering their appearance, Augustus perpetuated the primary motive of the Egyptians, by dedicating his monuments to the sun.[94]

Mercati on Earlier Projects for Moving the Vatican Obelisk

When Mercati published *De gli obelischi di Roma*, Sixtus V was in the fourth year of his pontificate and had already completed the raising of four obelisks. He commended the swiftness with which the pope achieved these heroics, noting that neither the Egyptians nor the Roman emperors had done so much in such little time.[95] To reinforce the accomplishment, he cites the history of failed attempts to raise the Vatican obelisk. Nicholas V (r.1447-1455) was the first of the popes who were "moved" by the magnificence of the obelisks.[96] The Nicholine project aimed to beautify the parts of Rome that had fallen into destitution. Gianozzo Manetto, biographer of Nicholas V, provides Mercati with an account of Nicholas's ambition to put Rome at the ideological centre of Christendom and ecclesiastical power.[97] The most aggressive change was reserved for the residential quarters between the Vatican and the Tiber, the Borgo Leonino. Part of this plan included re-building the Old Saint Peter's and the translocation of the obelisk to a

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[94] Mercati (1981), 235.

[95] According to an *avviso* from 1588, Sixtus had intentions to move two others, identified by Iversen as likely being those from the Circus of Maxentius and the Circus Varianus. These plans did not come to fruition due to the pope's death in 1590. See Iversen, *Obelisks in Exile*, vol. 1 (1968), 73. Iversen references the Urb. Lat. 1053. 533B, 24.XII, 1588 in Orbaan, "La Roma di Sisto V negli *Avvisi*" in *Archivio della R. Società di Storia Patria*, vol. 23 (Rome: Biblioteca Vallicelliana, 1910).

[96] Mercati, *Obelischi* (1981), 289.

[97] Key sources on the Nicholine obelisk project and the renovation of the Borgo Leonino include Torgil Magnuson, *Rome in the Age of Bernini*, vol. 1 (Stockholm: Almqvist & Wiksell International, 1982); and Carroll Westfall, *In this Most Perfect Paradise: Alberti, Nicholas V, and the Invention of Conscious Urban Planning in Rome, 1447-55* (University Park: Pennsylvania State University Press, 1974).

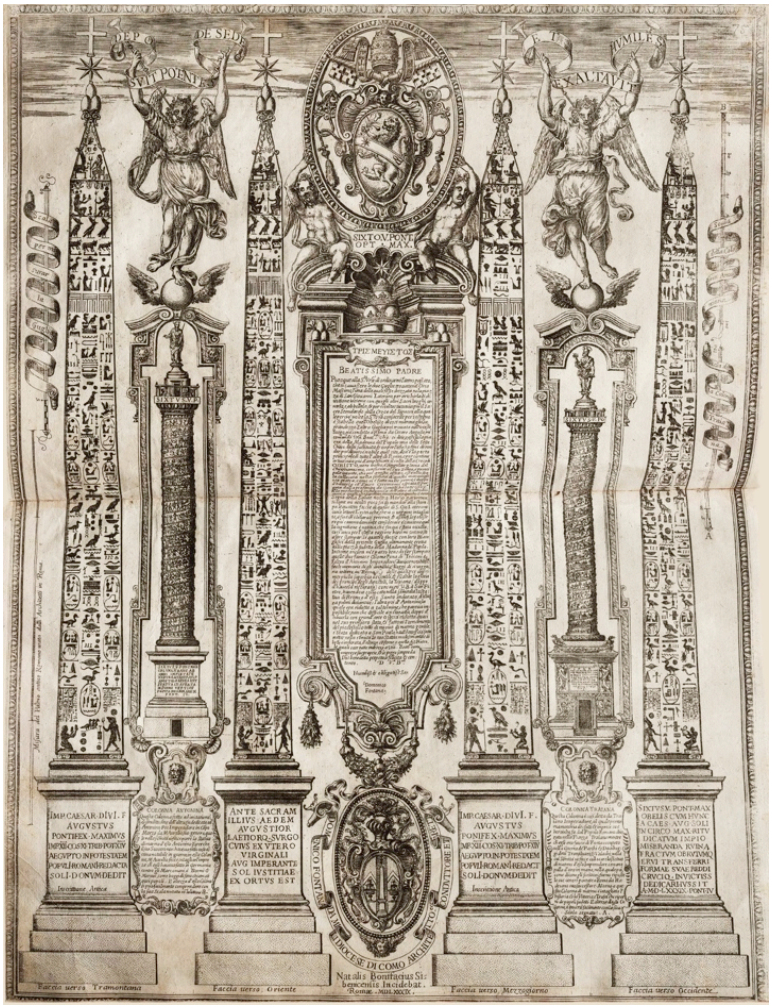

Figure 1.7 Flaminian obelisk, Santa Maria del Popolo, fol.75bis. *Della Trasportatione dell'Obelisco Vaticano*. Digital facsimile from the copy in the Library of Congress. Oakland: Octavo, 2002.

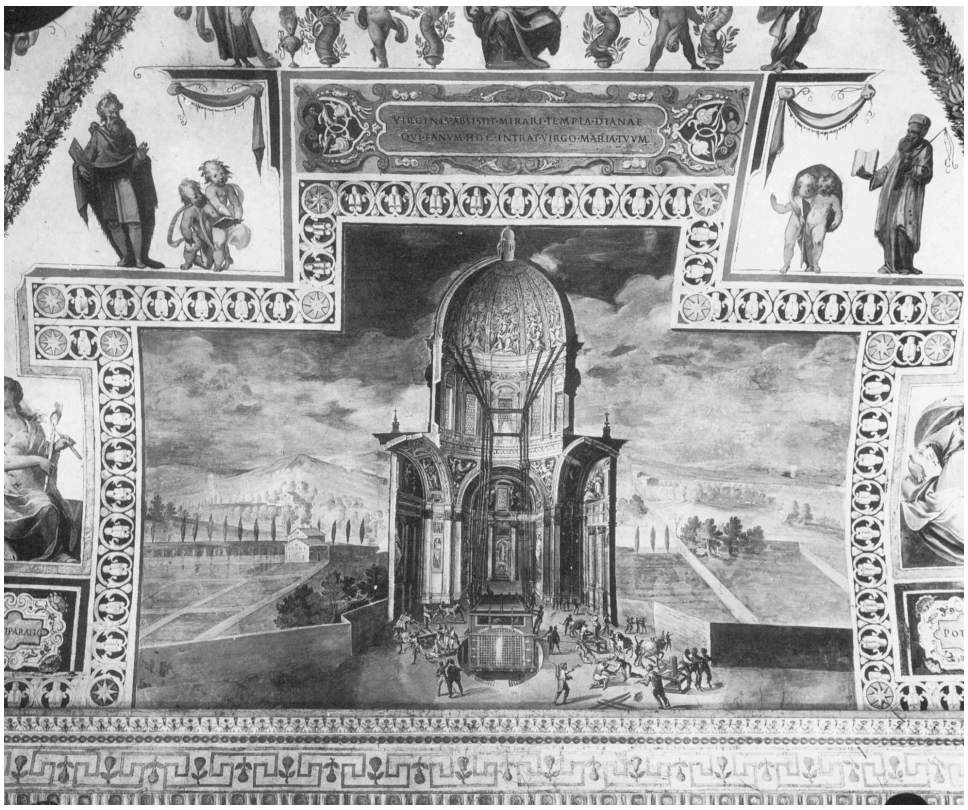

Figure 1.8 The Transportation of the Chapel of the Manger, Sixtine Chapel, Salone Sistino. In Corinne Mandel, "Felix Culpa and Felix Roma: On the Program of the Sixtine Staircase at the Vatican." *Art Bulletin* 75, no. 1 (March 1993), p.77.

new central position. Many scholars agree that Alberti was involved in the Nicholine project although he is not identified as an architect in Manetto's text.[98] Since the pedestal and base were covered, it was assumed that it was resting on four bronze lions. Nicholas V wanted to replace these lions with four colossal statues of the evangelists. Surmounting the obelisk would be another bronze statue of Christ bearing the cross on his shoulders.[99] The project met an abrupt end following Nicholas V's death in 1455. Similarly, Paul II (1464-1471) enlisted Aristotele Fioravanti (born Ridolfo Fioravanti, died c. 1475), the Bolognese architect and expert in lifting heavy objects to propose a device to move the Vaticanus. The same evening of this meeting, the pope suffered a fatal stroke and his plans perished with him.

Fioravanti's longstanding reputation for manipulating immense objects that were previously thought to be immovable extended well into the seventeenth century.[100] Among his recorded projects was the straightening of the clock tower of the Palazzo del Podestà in Bologna. In 1455, in the town of Magione, he relocated the church tower of Santa Maria del Tempo several meters from its origin (it weighed over 80 tons).[101] Only one eyewitness account of the movement of the campanile gives us an idea of the method and devices that Fioravanti employed.[102] In 1451 Fioravanti was on record for moving two giant columns from Santa Maria Sopra Minerva to Saint Peter's and was presumably consulted on the Nicholine obelisk

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[98] In *Obelisk a History*, the authors Brian Curran, Anthony Grafton, Pamela O. Long and Benjamin Weiss, see Alberti's obvious role in the Vatican obelisk project in the context of the reinvention of antiquity (2009), 76-77.

[99] Mercati, (1981), 289. Also quoted from Manetti in D'Onofrio (1992), 137.

[100] Fioravanti was transformed into a fabled architect and obelisk-mover in Filarete's *Trattato*.

[101] Bertrand Gille, *Engineers of the Renaissance* (Cambridge, MA: MIT Press, 1966), 95.

[102] See Gustina Scaglia for a hypothesis on the machines that were used for moving such a tower in "Drawings of Machines for Architecture from the Early Quattrocento in Italy," *JSAH* 25, no.2 (May 1966): 90-114, esp. fig. 14; also L. Beltrami, *Aristotele da Bologna al servizio del duca di Milano: 1458-1464. Documenti inediti,* Milan, 1888.

project.[103] Contemporary scholars suggest that the mention of his name indicates that by the mid-fifteenth century it was a shared belief that there was the possibility of moving a large object like the Vatican obelisk.

The obelisk was integral to Bramante's plans for St. Peter's prior to the rejection of the project by Julius II.[104] It was not until 1534, and the reign of Paul III, that the prospects for a relocation of the Vaticanus were raised with increased resolve. According to Mercati, Paul III had a great desire to commission Michelangelo, who was credited with the invention of the *argani* or windlasses to transport large blocks of stone, for the project. Michelangelo declined, citing his fear of breaking the precious artifact, although his ingenuity was thought by some, including the pope himself, to be unsurpassed.

After the Vatican obelisk, (which will be dealt with at length in later chapters here), the first obelisk to be moved now stands in the piazza at Santa Maria Maggiore on the Esquiline hill (fig. 1.9). The obelisk formerly acted as a sentinel on the west side of the entrance to the Mausoleum of Augustus before its collapse. City officials discussed moving this obelisk since rediscovering it in 1519, buried nearby in the Via di Ripetta, as three large fragments.[105] Its companion, flanking the eastern entrance, was raised in the seventeenth century at Montecitorio. Fontana transported the obelisk in the summer of 1587, placing it behind the church.

Mercati interpreted the inscriptions on the Augustan obelisks (now located in the Piazza di Montecitorio, and the Piazza del Popolo) as idolatry. Fontana described repairing the fractures in the ancient stones as an overwriting and a restoration. In *Della trasportatione* Fontana

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[103] Scaglia, (1966), 107.
[104] Mercati, *De gli Obelischi* (1981), 289.
[105] Iversen, *Obelisks in Exile*, vol.1, 47-49. Mercati, Chapter 41, "On the Obelisk of Santa Maria Maggiore", (1981), 307.

describes its renewed state: "It is in the best possible condition, and none of the fractures show. It was purified and consecrated with the cross on top of it, as with the others."[106] It was then newly engraved with an inscription:

> Sixtus V, Supreme Pontiff, Ordered this Obelisk, Dedicated by
> August Caesar in an Impious Rite to the Sun in the Circus
> Maximus, broken and overturned in woeful ruin, to be excavated,
> transported, and restored to its own beauty, to be dedicated to the most
> indomitable Cross. 1589, the fourth year of this pontificate.[107]

For Sixtus V and his physician Michele Mercati –considered an authority on Egyptian antiquities – the translocation of the obelisks was a metaphorical rewriting of Rome's physical and spiritual topography. The ancients may have triumphantly brought the obelisks to Rome, but these "illustrious symbols of the emperors" were left in ruin. Mercati describes the culminating moment of the obelisk story:

> The two past ruinations (as instruments of idolatry) have resulted in the glory to the true God, a glory that in [the obelisks'] new erection, is not only conserved in full but even increased. And therefore the praise that merits the ruin of the obelisks, raised by the instruments of false religion, does not detract from the praise of their new erection, to convert those same instruments in the use of the proper and holy religion.[108]

Moving the obelisks in Mercati's time both emulated and surpassed the intentions of the ancients. Their re-erection and consecration by Sixtus V evoked the origins of Christian Rome. The goal of this chapter was to provide the historical background on Domenico Fontana's Vatican obelisk project, the Sixtine translocations of obelisks, and Michele Mercati's history of obelisks.

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[106] Plate of the obelisk of Santa Maria Maggiore after the repair of its fracture, from *Della trasportatione* (1590), fol. 76r.

[107] Fontana, fol. 75 bis

[108] My translation. Mercati (1981), 293.

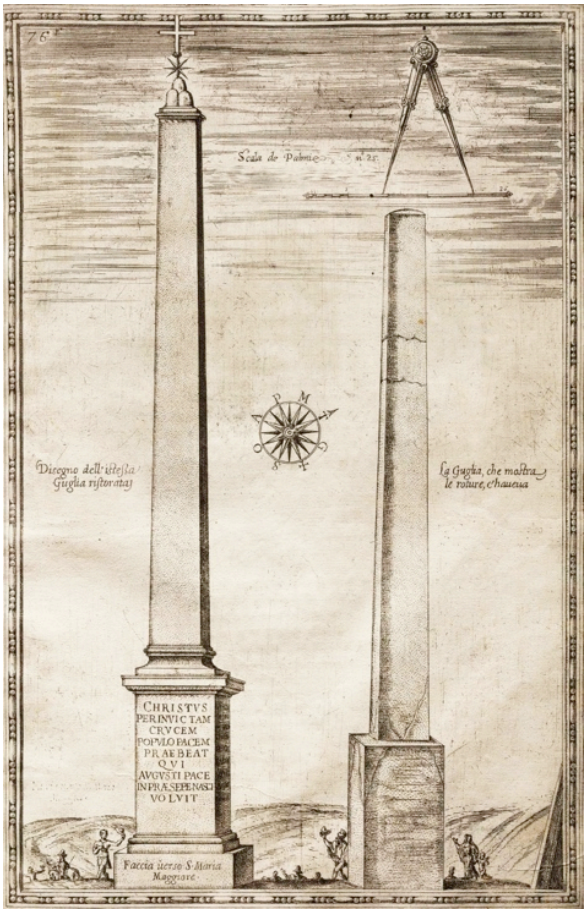

Figure 1.9 Esquiline obelisk, Santa Maria Maggiore, *Della trasportatione*, fol.76r. *Della Trasportatione dell'Obelisco Vaticano*. Digital facsimile from the copy in the Library of Congress. Oakland: Octavo, 2002.

CHAPTER 2

CAMILLO AGRIPPA'S PROPOSAL FOR MOVING THE VATICAN OBELISK

During the first year of the pontificate of Gregory XIII (r. 1572-1585), an unknown *ingegnere* approached the pope with a proposal to move the Vatican obelisk.[109] Though his effort was unsuccessful, the idea of such an ambitious undertaking remained intriguing to Gregory XIII. Nearly a decade later, in 1580, the Milanese mathematician, theorist, and architect Camillo Agrippa (c.1516 - c.1595) petitioned the pope with a device to carry out the same task. Agrippa demonstrated his method using a scaled model of the obelisk and the lifting apparatus. This exposition took place inside the *Metallotheca*, a geological museum inside the Vatican. Michele Mercati recalls the pope's skepticism about the proposal's feasibility:

> Of this machine, and of all the instruments pertaining to it, Agrippa made a small model with a miniature obelisk in proportion with the other instruments, to show how the obelisk could be moved with some ease and security. . . . The architect started to show all his machinery, trying to demonstrate with reason, the security and easiness of the project; his Holiness was still uncertain, due to a feeling in his soul. . . that in his opinion, it was

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[109] The source of this account, Michele Mercati, does not name this first engineer who approached Gregory XIII with a proposal: *"A Gregorio XIII si rinovò il medesimo desiderio di condurre l'obelisco vaticano sulla piazza di San Pietro, mosso da un ingegnere che venne a Roma il primo anno del suo Pontificato, il quale si offeriva di condurre questa impresa."* My translation. See Michele Mercati, *Gli obelischi di Roma*, ed. Gianfranco Cantelli (Bologna: Cappelli Editore, 1981), 291-2.

> impossible for the architects of our age to safely move to the piazza an obelisk of such size.[110]

Not much is known about Agrippa's biography, including his birthdate or how he may have characterized his own profession. Even his chosen name was potentially inspired by the Augustan engineer Marcus Agrippa or more likely by Henry Cornelius Agrippa of Nottersheim, the infamous Renaissance magus. A maker of wondrous things by melding experience in the mechanical arts with natural philosophy and mathematics, Cornelius Agrippa embodied the figure of the

> Magician, expert in natural Philosophy, and Mathematics, and knowing the middle sciences consisting of both these, Arithmetic, Music, Geometry, Optics, Astronomy, and such sciences that are of weights, measures, proportions, articles, and joints, knowing also Mechanical Arts resulting from these, may without any wonder, if he excel other men in Art, and wit, do many wonderful things, which the most prudent, and wise men may much admire.[111]

The *Occult Philosophy* notes several objects worthy of admiration, including the mechanical works of Daedalus, Archytas' flying wooden dove, and "the Pyramids of Julius Caesar erected at

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[110] My translation. See Michele Mercati, *De gli obelischi di Roma*, Cap. XXXVI: 345-6. The original Italian reads as follows: *Di questa machina, e di tutti gli instrumenti appartenenti fece il sopradetto Agrippa un modello picciolo, e ancora un obelisco picciolo, proportionato alla machina e à gli instrumenti, per mostrare con quanta facilità, e sicurtà si fosse potuto trasportare l'Obelisco. […] L'architetto cominciò à mostrare tutto l'artificio suo, approvando con molte ragioni la sicurezza e la facilità dell'opera; alle quali ragioni Sua Santità aveva caro che fosse contradetto, avendo già impressa nell'animo […] un opinione che fosse cosa impossibile à gli architetti della nostra età, di condurre à salvamento sù la piazza un'Obelisco di tanta grandezzza, e mostrò che già il desierio di trasferirlo non gli mancanva, ma che lo ritrahesse la desperatione di poter dar compimento all'opera."*

[111] Henry Cornelius Agrippa, *De occult philosophia*, Book II, Chapter 1, i. See Frances A. Yates, "Cornelius Agrippa's Survey of Renaissance of Magic," in *Giordano Bruno and the Hermetic Tradition* (Chicago: Chicago University Press, 1964), 130-43.

Rome near the Vaticanus".[112] It is possible that Camillo Agrippa chose his name because of the associations with both figures –the magus and the builder.

In 1583, Agrippa published *Trattato di Camillo Agrippa Milanese De trasportar la guglia in su la piazza di San Pietro* to disseminate his idea to a wider audience.[113] The pamphlet-sized book (235x170mm) contains a folded, engraved print (405 x 556 mm) illustrating his lifting solution and his theory of weights and motion. He dedicated the book to Gregory XIII's son, Giacomo Boncompagno, the Duke of Sora and Marchese of Vignola, and included a woodcut of the papal arms of Gregory XIII on the title page (fig. 2.1). This offering was, in part, a mea culpa to the pope for his inability to accomplish the enterprise. The dedication reminded the duke that the feat of moving the obelisk would inscribe his name for all eternity on the famous stone.[114]

Unlike Domenico Fontana, who would successfully moved the obelisk by dragging it horizontally in the 'ancient manner,' Agrippa wanted to move the obelisk in an upright position. His machine would elevate the obelisk, vertically, above its old pedestal and suspend it in place so that both the apparatus and the stone could move to the new location. The *Trattato* is an exposition for a machine that would demonstrate and exemplify the fundamental principles of weights and motion. In the latter part of the treatise, a philosophical dialogue applied his cosmology of the fencer's body to the movement of the obelisk.

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[112] Ibid.

[113] Camillo Agrippa, *Trattato di Camillo Agrippa Milanese di trasportar la guglia in su la piazza di San Pietro* […] (Rome: Francesco Zanetti, 1583).

[114] Agrippa, *Trattato di trasportar la guglia*, 4.

Figure 2.1 Portrait of Agrippa and frontispiece for *Trattato di trasportar la guglia*. Rome: Zanetti, 1583.

Over the course of his career, Agrippa's written work would embrace a variety of subjects including meteorology, navigation, and fencing.[115] The common strain in each was his profound interest in the practical application of cosmological motion. His first publication, *Scientia d'Arme* (1553), was a mathematical study of fencing that framed the movement of the body through a series of ideal positions and measures. The same principles governing all celestial or earthbound bodies determine how the human body should move in combat or how the immense weight of an obelisk should move. His decision to move the Vatican obelisk vertically and the resulting design of the machine followed the natural order that he envisioned.

Few scholars of Fontana's Vatican obelisk project elaborate on Agrippa's role in its inception. Most evaluations of his proposal have largely focused on issues of technical validity. For instance, in his authoritative work on the history of engineering and technology, *Engineers and Engineering in the Renaissance*, William Parsons deems Agrippa's design as faulty, inept

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[115] Agrippa published five texts in the vernacular, the first being his treatise on a method for fencing, *Trattato di scientia d'arme* (1553). Agrippa also had an interest in the military arts, writing a treatise on that subject, *Dialogo del modo di mettere in battaglia presto et con facilità il popolo di qual si voglia luogo con ordinanze et battaglie diverse* (Rome, 1585). On astronomy he published *Modo da comporre il moto nella sfera*, a reprint of the dialogue on natural philosophy published in the *Scientia d'arme* two decades earlier. A year after his work on the Vatican obelisk, he published a text on the generation of winds and other natural phenomena, *Sopra la generatione de venti, baleni, tuoni, ecc.*(1584). Agrippa's last work was his unpublished treatise on navigation, *Nuove inventioni sopra il modo di navigare* (1598).

and "lacking in every essential of sound engineering principles".[116] A more recent reappraisal by Adriano Carugo is a critique of Parsons, which grants Agrippa's invention a larger role in the development of Fontana's scheme.[117] Carugo attributes part of Fontana's success to technical features derived from Agrippa including the pyramidal scaffold and oak sheathing to protect the obelisk. Even Fontana's use of a scale model as part of his demonstration likely originated with Agrippa's petition tactics. This chapter argues that Camillo Agrippa's definition of the project — as a practical inquiry into his theory of motion — characterized its meaning in its broader intellectual context. For Agrippa, as well as his contemporaries, the Vatican obelisk project was the greatest opportunity to demonstrate ideas about nature and motion as well as to exercise expertise in practical mechanics.

MIRRORING THE COSMOS

In the frontispiece to *Scientia d'Arme,* Agrippa recounts a dream where he found himself under attack by a throng of philosophers who opposed his geometrical description of fencing. He feared that "they thought [him] presumptuous for wanting to discuss such matters without having

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[116] William Barclay Parsons, "Moving the Vatican Obelisk" in *Engineers and Engineering in the Renaissance* (Cambridge, MA: MIT Press, 1967), 156. In a much later study, science historian Elio Nenci suggested that perhaps Parsons had based some of his arguments regarding the lack of diagonal bracing on Agrippa's machine by looking at the simplified version that appears in the diagram, since the text itself makes note of the need for more stability via bracing. See Elio Nenci, "*Camillo Agrippa: un ingegnere rinascimentale di fronte ai problemi della filosofia naturale*," in *Physis*, vol. XXIX, 1992. Other discussions of Agrippa's proposal as a predecessor to Fontana include Henry J. Cowan, *The Master Builders: A History of Structural and Environmental Design from Ancient Egypt to the Nineteenth Century* (New York: John Wiley & Sons, 1977); Bern Dibner, *Moving the Obelisks* (Norwalk, CT.: Burndy Library, 1950); and George Sarton, *Agrippa, Fontana and Pigafetta: The erection of the Vatican obelisk in 1586* (Paris: J. Peyronnet et Cie, 1948).

[117] Adriano Carugo's essay, "Obelisks and Machines in the Renaissance" (1977), provides a fundamental discussion of the influential literature and ideas on Domenico Fontana's project, including the influence of Agrippa's proposal.

studied them."[118] The engraving of this vision depicts the author trying to flee the clutches of the imagined mob (fig. 2.2). As he fends off the assault, supporters wielding mathematical instruments come to his aid. The commotion ensues over a conspicuous geometric figure inscribed in the ground at the tip of Agrippa's sword. The nightmare reveals the author's intense anxiety over the reception of his treatise. There are signs that he anticipated the analytical sections of his work to be met with skepticism even prior to its release. According to the *motu proprio* in the treatise's front matter, the basis for the publisher's ten-year printing and selling privilege, was that "nothing like this work [had] ever been seen in modern or in ancient times, and [Agrippa had] produced it by many long nights of hard work and the greatest ability and effort."[119]

Contrary to this claim, the setting of the imagined dispute amidst classical ruins suggests that Agrippa derived his authority from ancient wisdom. Of the two Egyptian obelisks clearly visible in the background, the foremost bears legible, hieroglyphic symbols. The Vaticanus, the only standing obelisk in Rome during Agrippa's time was devoid of hieroglyphs. This contrivance, appealed to the belief in Egyptian monuments as fonts of divine knowledge. The symbols were likely emblems of his patrons and declarations of his social aspirations.[120] However, given the wide currency of Egyptian imagery in Renaissance humanist culture, they

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[118]Unless otherwise noted, translations for the *Scientia d'Arme* are by Kenneth Mondschein, in *Fencing: A Renaissance Treatise by Camillo Agrippa* (New York: Italica Press, 2005). This passage is excerpted from Agrippa, *Scientia d'Arme* (2005),104.

[119] Agrippa, *Scientia d'Arme* (2005), 3-4.

[120] In *Fencing: A Renaissance Treatise*, Kenneth C. Mondschein makes a reasonable argument about how Agrippa is trying to connect himself to the Farnese family and the Neoplatonic tradition by suggesting possible symbolic interpretations of the hieroglyphs that appear in the frontispiece — the eel, eagle, and the duck (see esp. LXXVIII-LXXXIII).

Figure 2.2 Agrippa's dream, *Scientia d'Arme.* Rome: Antonio Blado, 1553.

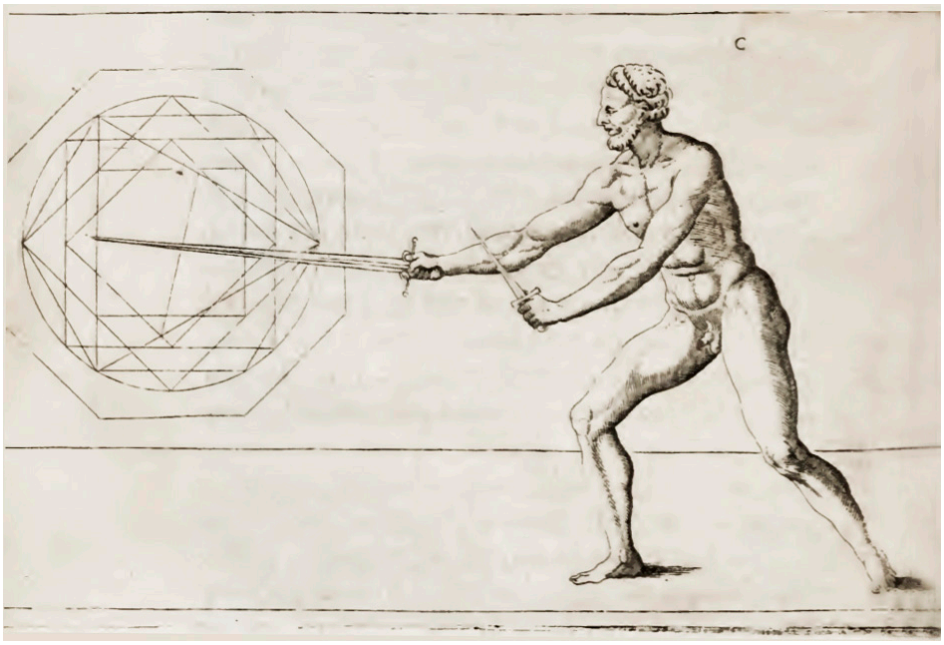

Figure 2.3 The third guard denoted C with geometrical figure, *Scientia d'Arme.* Rome: Antonio Blado, 1553.

also serve as allusions to Agrippa's fidelity to philosophy, mathematics, and hermetic knowledge.[121]

The Cosmology of Fencing

The aim of *Scientia d'Arme* was to delineate the actions of the body, their placement and timing for the purpose of mathematical study. The work consists of two parts: a practical discourse on the principles of fencing and their applications, and a philosophical dialogue on the construction of the geometric figures and their cosmological significance. In Agrippa's words:

> This pursuit is ultimately governed by points, lines, times, measures, and so forth, and comes from thinking in a mathematical — which is to say, a geometrical— fashion.[122]

In the discourse, Agrippa defines the tetrad, the four principal guards from which all movements and actions in dueling are derived. An ideal nude illustrates these postures in action, accompanied by points and lines representing the proper relation between the body and weapon (fig. 2.3). Letters denote each guard posture at every occurrence in the text. He also reminds the practicing fencer that each figure can be easily reconstructed in sand with a wooden stick.[123]

Agrippa intended the frontispiece of the *Scientia d'Arme* to lend credence to his mastery over the principles of fencing, though he received no training as a master of arms (see fig. 2.4). The engraving depicts the author, armed with his sword, in the company of philosophers,

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[121] For a more in-depth discussion of the interpretation of Egyptian antiquities in Renaissance humanist culture see Brian Curran, *The Egyptian Renaissance: The Afterlife of Ancient Egypt in Early Modern Italy* (Chicago: University of Chicago Press, 2007); Erik Iversen, *The Myth of Egypt and its Hieroglyphs in European Tradition* (Copenhagen: Gad, 1961) and Karl Dannenfeldt, "Egypt and Egyptian Antiquities in the Renaissance" in *Studies in the Renaissance* 6 (1959) 7-21.

[122] Agrippa, *Scientia d'Arme* (2005), 10.

[123] Eventually Agrippa does instruct the reader how to do this in the philosophical dialogue. So the fencing student is also a student of his cosmology.

engaged in dialogue. The terrestrial globe at his foot, an armillary sphere in one hand, a pair of dividers in the other, symbolize a command of the earthly realm and his knowledge of the heavens. In the foreground, a sword and a gauntlet overlaid by a geometric figure indicate that the art of fencing is governed by mathematics and geometry.

In the second part of the treatise, the "Dialogue of Agrippa and Annibale Caro" is the author's attempt to evince a deep cosmological wisdom. It recounts a meeting with his patron, the poet and writer Annibale Caro (1517-1566), over a three-day period. On the first day, Agrippa (referred to as Camillo in the dialogue) approaches Annibale to advise him of his concerns regarding the work's publication. Annibale urges him to consider adding an explanation for the various geometries since, otherwise, "they can confuse the readers."[124] Agrippa stresses that a recreation of the four guard positions allows the practitioner to perfect his technique (fig. 2.5). On the following day, Agrippa returns to Annibale's residence to interpret the geometric template for the guard positions as a celestial model (fig. 2.6). This model resembles an armillary sphere illustrated by Ignazio Danti in his translation of a treatise on spheres by Proclus (fig 2.7).[125] This leads to a debate concerning the key difference between the center of the earth and that of the universe. For Agrippa, this phenomenon is readily observable in nature.

Of utmost importance in the dialogue is the break from the predominant Aristotelian and Ptolemaic model of the cosmos, at this time, which posited a fixed and immobile earth at its centre. Agrippa envisioned a distinct centre for the earth moving independently from the centre of the heavenly sphere according to variability in lightness and heaviness. With a mobile centre

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[124] Agrippa, *Scientia d'Arme* (2005), 104.

[125] For the use of Danti's terminology in Agrippa's description of the earth, see Elio Nenci, 84.

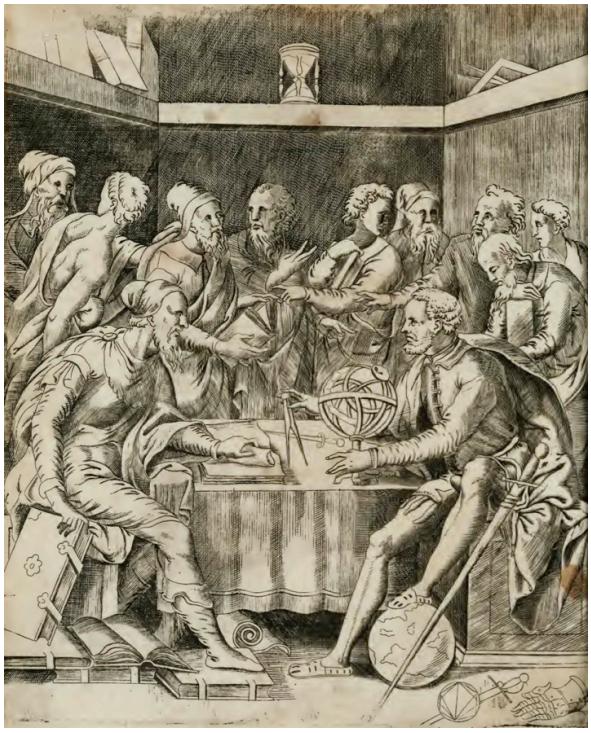

Figure 2.4 Frontispiece engraving, *Scientia d'Arme.* Rome: Antonio Blado, 1553.

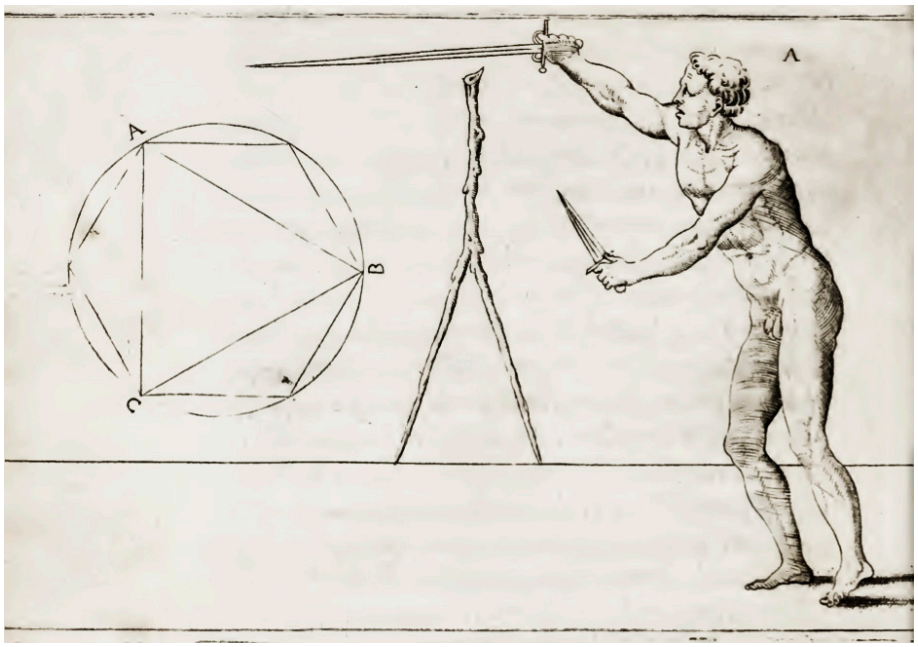

Figure 2.5 The first guard with geometric figure and bifurcated stick for constructing it, *Scientia d'Arme.* Rome: Antonio Blado, 1553.

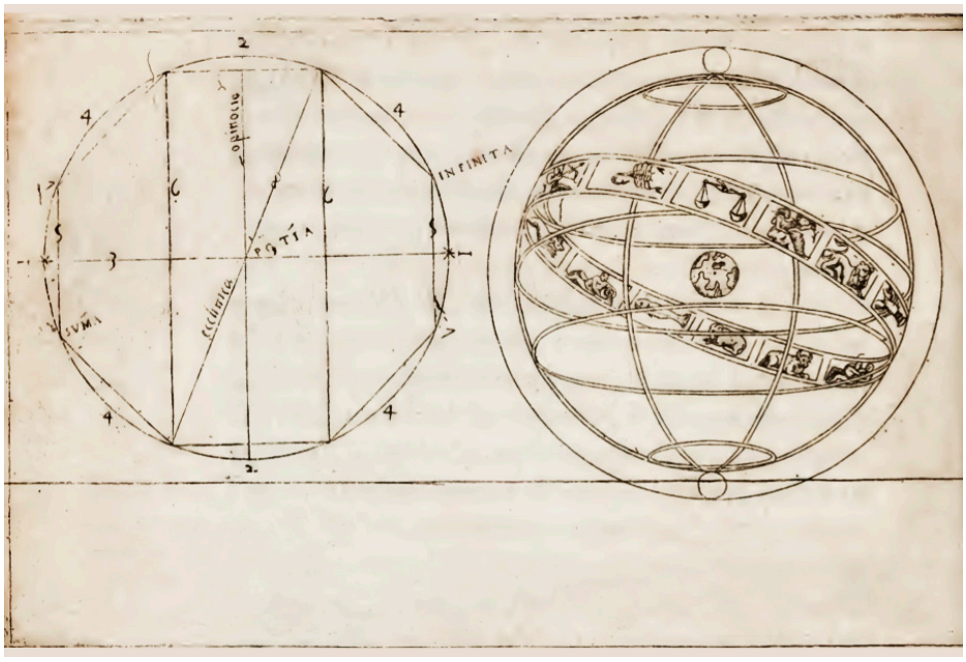

Figure 2.6 Constructed geometrical diagram and celestial sphere, *Scientia d'Arme.* Rome: Antonio Blado, 1553.

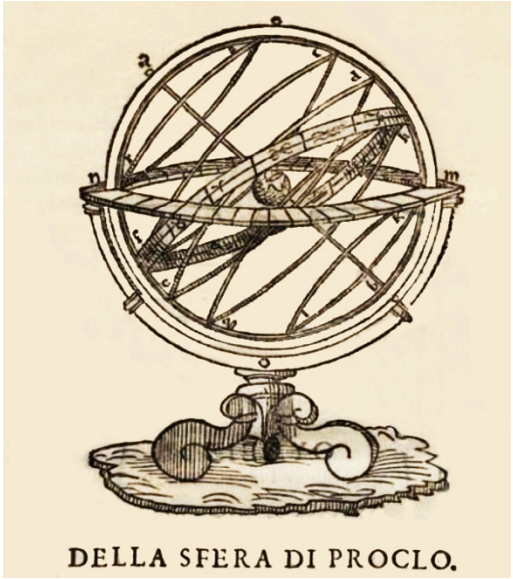

Figure 2.7 Celestial sphere from Ignazio Danti's *Della sfera di Proclo*.

of gravity, influenced by terrestrial changes (e.g. shifts in seasons), the earth always moves to recover its origin, coincident with the centre of the universe.[126] Thus, the distribution of the heavy and light humors that dictate the qualities of the cosmos, also influence the weight of the earth. When Annibale asks, "How can the lighter part rise again in such a system?" Agrippa replies, "It will always become heavy again the same way that it was made lighter." Once Annibale reasons that, "the earth must be mobile", Agrippa confirms that, "it cannot be otherwise. Because of the way the universe is constructed, the center, against which the weight of the earth rests, could not allow it to be any other way."[127] The earth's capacity for translatory motions, an idea integral to Agrippa's cosmological model, seems to be largely derived from fourteenth-century inquiries such as Nicole Oresme's *On the Sphere* and Jean Buridan's *De caelo*. A number of scholars have contextualized the works of these cosmographers as a radical departure from the Aristotelian picture and as a precursor to a Galilean model of the universe.[128] In fencing, the motile earth makes the body the mirror of the world, thereby endowing the individual with the agency to react. According to Agrippa's system, all movement emanates from the fencer's centre, that is, from the waist or torso. It is also from moving this centre that

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[126] For an overview of the predominant Aristotelian understanding of the celestial and the sublunar world, see E.J. Dijksterhuis, *The Mechanization of the World Picture: Pythagoras to Newton*, trans. C. Dikshoorn (Princeton: Princeton University Press, 1950) 17-42; Paolo Rossi, *The Birth of Modern Science*, trans. Cynthia De Nardi Ipsen (Oxford, UK: Blackwell, 2001) and also Edward Grant, *Planet, Stars & Orbs: The Medieval Cosmos 1200-1687* (Cambridge: Cambridge University Press, 1994).

[127] Agrippa, *Scientia d'Arme* (2005), 117.

[128] For Oresme's impact on medieval scientific thought see Marshall Clagett, "Nicole Oresme and Medieval Scientific Thought", *Proceedings of the American Philosophical Society*, v. 108, no. 4, August 1964, 298-309. A translation of *On the Sphere* can be found in Garrett Droppers, "*The Questiones de Spera of Nicole Oresme. Latin Text with English Translation, Commentary and Variants.*" PhD diss., University of Wisconsin, 1966.

one evades the sword of an opponent.[129] The dialogue in *Scientia d'arme* that presents Agrippa's understanding of the cosmos (and how this determines his model for fencing) is carried over into his project for the Vatican obelisk). As we shall see later in this chapter, Agrippa refers back to this discussion from *Scientia d'arme* in the philosophical dialogue that accompanies his treatise on moving the obelisk.

Time and Motion

In the frontispiece, an hourglass looms above the fray to govern all things critical to the knowledge of fencing. The illustrations of the human figure in the *Scientia d'Arme* demonstrate not only the principles of fencing, but also of the relationship between time and motion. In the first book, the four main guards are shown with their ten variations — narrow versus wide stance, right-foot versus left-foot forward. Subsequent plates of the guard positions describe front, rear, and side views to exaggerate their status as moments of action (fig. 2.6). The illustrations in Book Two explore in greater depth the movements of attacks and counter-attacks in combination. Dueling figures transition from one position to another, responding to their opponents' motions (see for example fig. 2.8). Agrippa clarifies that these representations show the figure moving in time:

> They are one in the same figure, defined only once [...] They are shown according to their position in space in the same way that anything shows a new perspective when it is seen from a little in front or to the rear or to the side because of some movement or action that

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[129] In his discussion of the use of the cosmological metaphor in *Scientia d'Arme*, Kenneth C. Mondschein argues that the cosmological analogy is not arbitrary but rather deliberately places the human body in motion as the perfect reflection of the cosmos. It is his analysis of Agrippa's cosmology that led me to understand Agrippa's debt to Oresme and Buridan.

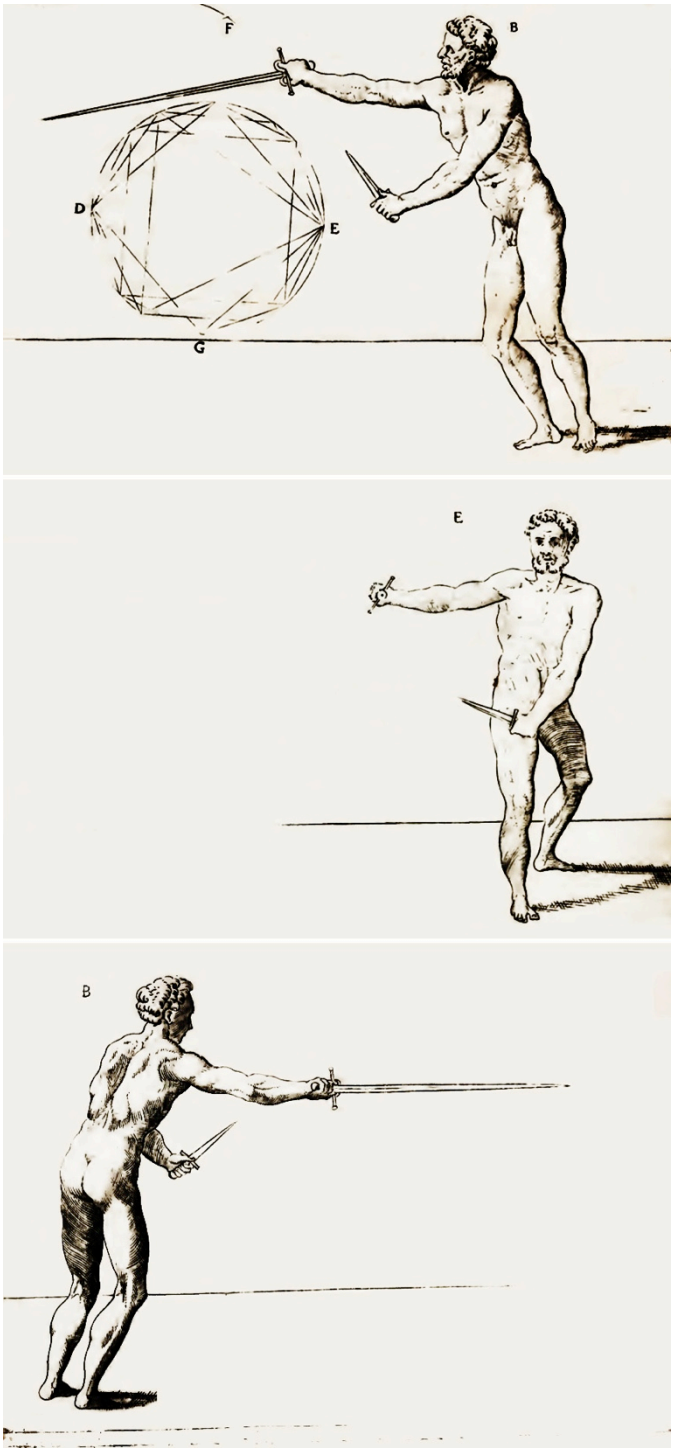

Figure 2.8 Variations of the Second Guard, *Scientia d'Arme.* Rome: Antonio Blado, 1553.

Figure 2.9 *Scientia d'Arme* (1553), Sequence F-I to C-C-K. *Scientia d'Arme.* Rome: Antonio Blado, 1553.

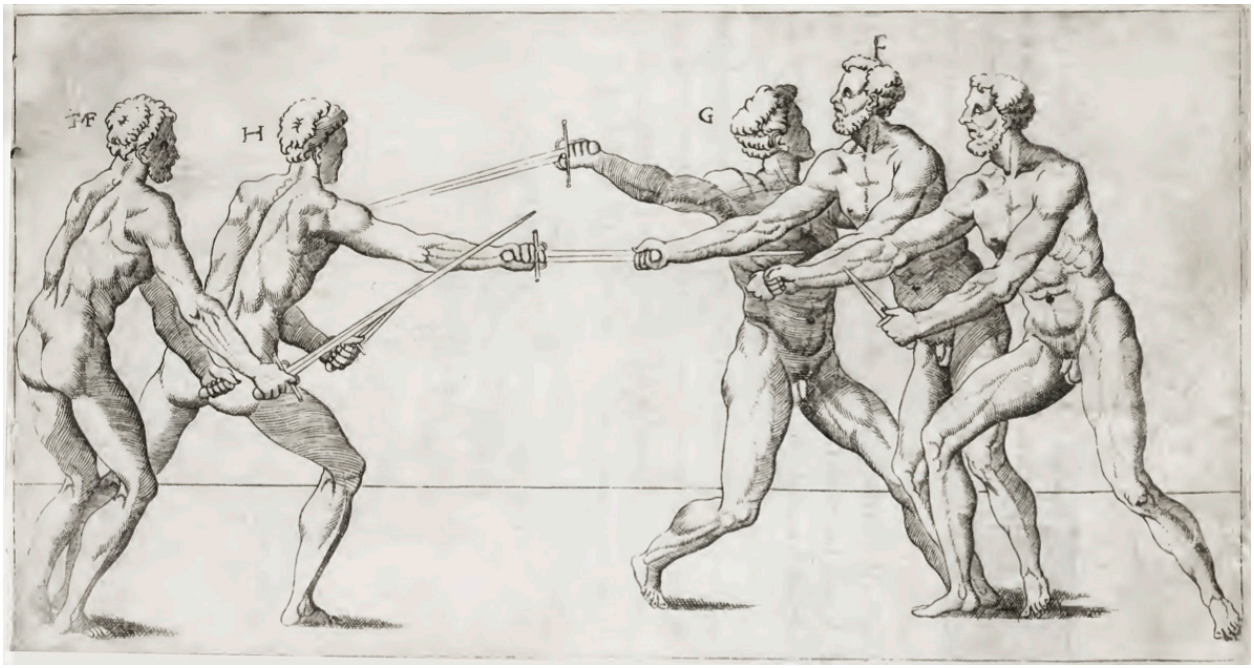

Figure 2.10 Plate 48V showing sequence F-H to C-C-G. *Scientia d'Arme.* Rome: Antonio Blado, 1553.

> it might make (except for a ball, which, though turned to any side, shows nothing other than light or dark).[130]

Plate 48V, for instance (fig. 2.10) illustrates the combatant on the right, beginning in the third guard position, switching stance and then turning to engage Action 'G" to counter to his rival's attack.

Scientia d'Arme is part of a broad trend in sixteenth- and seventeenth-century to develop notation for movement through combat manuals.[131] In fencing, the measure of time serves as the basis for phasing a suite of offensive and defensive stances. A single action or movement is defined as a single *tempo* or interval. The analytical breakdown of fencing as a series of movements in time allows it to be dissected for teaching purposes so that a fencer can respond to an action of one *tempo* with an action of the same *tempo*. Agrippa demonstrates this understanding of time in Book One when he analyzes an action as it unfolds:

> If the two of you are in second [...], then quickly find the enemy's sword with yours, again engaging the blade on the outside. If the enemy thrusts at the same time that you move your sword, then without raising or evading his weapon, you can easily hit him in countertime because of the number of motion he has made."[132]

Agrippa thus experimented with the visual representation of time and motion. He extended his thoughts on fencing to the nature of movement itself. His drawings encapsulate Aristotle's

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[130] There had been some confusion over the overlapping figures in these diagrams, having been interpreted by those that had not read the text carefully as being multiple figures showing different postures rather than a figure showing a transition from one movement to the next, in opposition to a figure also shown in sequential postures. Agrippa does in fact clarify the intentions of these illustrations in the passage reproduced here.

[131] Although skeptical of the impact of the geometric figures in the *Scientia d'Arme*, Sydney Anglo describes Agrippa's vision of fencing and the use of illustrations has inciting a major shift in the approach to representation in fencing manuals. See Anglo, T*he Martial Arts of Renaissance Europe* (New Haven, CT: Yale University Press, 2000).

[132] Agrippa, *Scientia d'Arme* (2005), 49.

sensorial understanding of time as "a number of motion in respect to the before and after." In the sixteenth century, this is still the widely held concept of time—a relative concept measured by and inseparable from the qualities of motion and change.

Agrippa states that he did not provide the expanded discussion on the geometric figures in the discourse fearing "that it might seem that [he wanted] to discuss geometry rather than arms".[133] However, by including the philosophical dialogue as the theoretical basis for his discussion of fencing, he makes geometry and its cosmological analogy the treatise's underlying premise. Fencing becomes the practical means to investigate his observations of nature. In the *Trattato di trasportar la guglia* (1583), he, again, pursues the interest in a motile earth and the indivisible phenomenon of time and motion. Before this realization could reach fruition, Agrippa would develop his skills as a practitioner and build his reputation as an inventor of practical devices for the transportation of water.

Moving Water

After the success of *Scientia d'Arme* in 1553, Camillo Agrippa would not publish again for another twenty-two years when he released *Modo di comporre il moto della sfera*, a reprint of the fencing treatise's dialogue on astronomy.[134] While in Rome in the 1570s, he witnessed a burgeoning culture fascinated by 'acts of moving', the transportation of heavy weights—obelisks, columns—and the manipulation of the natural flow of waters—fountains, aqueducts. As physical and symbolic mechanical acts, these alterations of the urban fabric anticipated Agrippa's own work on the Vatican obelisk project.

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[133] Ibid., 15.
[134] The reprint was published by the heirs of the original publisher, Antonio Blado.

From 1574 onward, Agrippa was engaged in two ambitious hydraulic experiments on the Pincian hill. The waters of the Augustan Roman aqueduct, the Aqua Virgo, built by Marcus Agrippa in 19 BCE, ran approximately thirty meters below the hill on which the villa was built. These projects were part of the scheme to rejuvenate the ancient system of Roman aquifers, known by the sixteenth century as the Aqua Vergine, through the construction of a grand network of fountains, gardens and villas.[135]

Cardinal Giovanni Ricci da Montepulciano (1498-1574), who purchased land on the Pincio in 1567, already had some experience with the urban water system, having administrated the restoration of the Aqua Vergine from 1567-1570.[136] He hired Agrippa to design a hydraulic system to provide his villa gardens with a more convenient source of water. Ricci's provisional solution employed a crude system of mules and buckets to bring water up a ramp to his garden. None of the ancient precedents for water pumps would suffice since the extreme change in elevation demanded an incredible amount of hydrostatic pressure.[137] Agrippa's design consisted of a dam, a waterwheel and a pump placed inside one of the existing access shafts to the aqueduct. Inside the aqueduct channel, he constructed a dam to raise the level of the Vergine by

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[135] For a complete discussion of the Roman aqueducts and urban transformation see Katherine Wentworth Rinne, *The Waters of Rome: Aqueducts, Fountains, and the Birth of the Baroque City* (New Haven and London: Yale University Press, 2010). For Agrippa and the aqueducts below the Pincio see Rinne (2010), 111-115 and Leonardo Lombardi, "Camillo Agrippa's Hydraulic Inventions on the Pincian Hill (1574-1578)", trans. Katherine W. Rinne, *The Waters of Rome*, no. 5 (April 2008) http://www3.iath.virginia.edu/waters/Journal5LombardiNew.pdf (accessed March 25, 2012).

[136] Later his house on the Pincio would become the Villa Medici. For more on the architectural history of the Villa Medici see Glenn M. Andres, *The Villa Medici in Rome*, 2 vols. (New York: Garland, 1976).

[137] Lombardi outlines the precedents for water pumps and their inadequacies in this situation (2008), 2-4.

two meters. A waterwheel inside a parallel channel drove the pump and conveyed water the remaining distance to the gardens.

The success of this design, lead to another commission for the same villa in 1577. Cardinal Ferdinando de' Medici, the new owner, hired Agrippa to expand the hydraulic machinery to incorporate the Parnassus, an artificial hill that would become the feature of the redesign.[138] Archaeological evidence suggests that the water-lifting mechanism at the bottom of an existing shaft was reconceived, not only to increase the capacity of the hydraulic waterwheel and pump, but also to provide access to the Vergine, below, with a spiral staircase inside the shaft.[139] He ingeniously incorporated a conduit into the stair's handrail to transport water from the pump to ground level where a trench would conduct the flow into a cistern within the Parnassus. The hydraulics culminated with a spectacular display that emanated from a fountain on the hilltop before its arrival at the gardens of the villa.

Cardinal de' Medici immortalized Agrippa's mechanical ingenuity with the epitaph: "Marco Agrippa (son of Augustus) drove the Virgin Waters in Campus Martius, Agrippa and his work is esteemed, Camillo Agrippa drove water to the top of the Pincio, his genius is distinguished."[140] The original inscription, now lost, honoured Agrippa's design for the water-lifting device at the Villa Medici. The only other substantial reference to his hydraulic projects at the Villa Ricci/Medici is Andrea Bacci's treatise on hydraulic engineering *De Thermis* (1588).

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[138] Cardinal Ricci died in 1576 and the Villa was then purchased by Cardinal Medici, who later served on the panel that chose the designer and method for moving the Vatican obelisk in 1586.

[139] This *pozzo* is known as "*La chiocciola del Pincio*". See Lombardi, (2008), 6.

[140] The original inscription reads "*Marco Agrippa (genero di Augusto) condusse l'acqua Vergine in Campo Marzio, Agrippa e l'opera sua sono egregi, Camillo Agrippa condusse l'acqua al vertice del Pinco, il suo ingegno è esimio*."

Bacci confirms Agrippa designed a water-lifting device that raised the waters of the Vergine an astounding fifty meters, and that he devised a mechanism unknown to the ancients.[141]

No physical evidence of the magnificent waterwheel or pump remains today and the noticeable silence on the experience in Agrippa's subsequent writings is puzzling.[142] In his treatise on the obelisk project, *Trattato di trasportar la guglia*, Agrippa vaguely and humbly alludes to being employed as an inventor of devices useful to the public good.[143] Despite Cardinal de' Medici's commendation, and evidence that the device outweighed its antecedents in its complexity, Agrippa's invention received little recognition.[144] Regardless, this project is a testament to Agrippa'skill and experience in designing sophisticated hydraulic machinery and effectively transporting waters.

Machine as Model

In the sixteenth century, the machine was a locus for a preoccupation with the metaphorical associations of movement. The increasing appearance of machines within cities, fortifications, and court spectacle made them sources of delight and wonder but also potent

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[141] Andrea Bacci, *De Thermis* (Rome, 1588), 431.

[142] In a recent study of Agrippa's hydraulics, Leonardo Lombardi hypothesizes about how such a remarkable invention, by all evidence unprecedented in this age of fantastic water marvels, would be forgotten within only a few years of its achievement. He cites two reasons. The first is that the new device, was no longer necessary after the Acqua Felice brought water to the Villa Medici in 1592. The second possibility, and the one Lombardi thinks is more likely, is that in 1588 Ferdinando de'Medici left Rome for Florence to become the Grand Duke of Tuscany, leaving his garden project behind. No further references to Agrippa's novel device seem to exist. Interestingly though, as Lombardi points out, the gravity-defying capabilities of Agrippa's system would not be tackled again until Versailles (2008), 8-9.

[143] "*Perche trovandomi io impiegato a inventioni non meno utili al ben public, che honorevoli, mi dispose di cercare a mio motere un modo tale….*" This passage is located in the dedication to Agrippa's patron, Giacomo Boncaompagno, in *Trattato di Trasportar la Guglia* (Rome: Zanetti, 1583), 3.

[144] See Rinne, *The Waters of Rome* (2005), 112-15 and Lombardi (2008), for further discussion of the novel idea that Agrippa pursued in his device.

symbols of political power. In *Engines of the Imagination: Renaissance Culture and the Rise of the Machines*, Jonathan Sawday describes the role of the machine as a metaphor for philosophical thought in Michel de Montaigne's writings.[145] On his European voyages from 1570-1571, Montaigne described his encounters with mechanical devices as a profound aesthetic and intellectual experience. In particular, he enjoyed watching the intricate movements of working machines. The fact that a machine moved made it an ideal model for the philosophical mind.

Agrippa's account emphasizes that he first arrived in Rome in 1535 because he wanted to work on the esteemed project of moving the Vatican obelisk. He had been preoccupied with the *guglia* for more than three decades, which is to say, well before he wrote *Scientia d'Arme*. He confirms the enterprise as a worthy challenge by reminding the reader that the greatest minds of his era, Michelangelo and Antonio da Sangallo had pondered it as well.

A distinctive passage from *Trattato di trasportar la guglia*, describes Agrippa's audience with Gregory XIII, where he performed the movement of the Vatican obelisk with a miniature replica of the obelisk and his machine.[146] He overcompensated its measurements in order to ensure his device's effectiveness. According to his calculations, the model was able to carry the equivalent weight of two obelisks.[147]

However, during Gregory XIII's pontificate, the idea of disturbing the obelisk faced considerable resistance. Agrippa was compelled to defend the undertaking:

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[145] Jonathan Sawday, *Engines of the Imagination: Renaissance Culture and the Rise of the Machine* (New York: Routledge, 2007) 31-69.

[146] Agrippa, *Trattato di trasportar la guglia,* 5.

[147] "*siche la dimostratione è sicura à far l'opera buona & facile, oltre che il modello portarebbe due altre guglie di piombo*."

> Since it is the opinion of some, that we should not move the guglia, they are giving advice to the Prince, that it would be fine beside the temple of St. Peter's. It is fine the way it is, it is below grade, 4 *canne* and 2 *palmi* more or less…. To put it at a similar height and to the height of the level of the temple would be a huge expense, and there would be a huge danger of breaking it. Even if you do not have to move it, it is still difficult to raise it. Now that I have my turn to say it, it is my thinking and I am expressing it publicly for the good of the world and to honor god.

Against the reactionaries who preferred to excavate and lift the partially buried obelisk but not to relocate it, he reasoned that the lifting operation alone constituted the greatest challenge to the delicate equilibrium of the stone. The determination, first to gain an audience with the pope, and second to demonstrate the veracity of his principles in a treatise, makes Agrippa the progenitor of the successful execution, but not the one to assume the undertaking.

MOVING THE OBELISK

To extend the enterprise beyond mere speculation, Agrippa transformed his rejected model into a complete treatise. Published by Francesco Zanetti in Rome, 1583, *Trattato di trasportar la guglia*, documents the form and construction of his apparatus for lifting the obelisk, as well as the principles on which the machine is expected to work. Agrippa used his publication as another opportunity "to try and get the project in motion" despite the circulating doubt and criticism for the project.[148] The structure of the piece is inherited from *Scientia d'Arme*. It opens with a discourse on the practicalities of his system and follows with a dialogue on the philosophical tenets that ground the project. Throughout the text, Agrippa emphasizes the novelty of his device by asserting that the ancients never moved an obelisk in a vertical position. Here, the motile earth that govern the laws of fencing also underpin the validity of his proposal.

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[148] My translation. Agrippa, *Trattato di trasportar la guglia*, 3.

The contention of his originality is easily refuted. Mercati mentions Spartianus' description of Nero's one-hundred-foot-high colossus which was moved "upright and dangling in the air" using a caravan of twenty-four elephants.[149] Yet another mechanism is presented in Jacques Besson's *Theatrum Mechanorum* (1571-1572), just prior to Agrippa's audience with the pope. Although the device differs substantially, it drives the obelisk along a track, vertically, using the Archimedean principle of the lever. Other obelisk and column-movers that were in circulation during this period, involved moving the obelisk while keeping it erect using Archimedean screws. Domenico Fontana would later comment on the prevalence of vertical proposals for raising the *guglia*.

The Machine for Raising the *Guglia*

In the first part of his little treatise, Agrippa outlines the details of his system and the criteria used to devise them.[150] His ideal machine would avoid the demolition of buildings and, in particular, limit the use of ropework and pulleys, which would be unreliable in bad weather. The solution was to lift the obelisk by using a system of chains. In his introduction to the model, he estimates the size and weight of the obelisk and considers its path of movement. He notes that the slope of the path would need to be assessed and leveled in order to accommodate the transit of the machine. Constant adjustment of would be needed to maintain the obelisk's verticality along its course. Finally, he mentions the new foundations for the obelisk need to be constructed at its final location. An engraved drawing included in the treatise shows the obelisk in its final

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[149] Appears in the *Vita Adriani*.

[150] For the sake of brevity the complete description of the method and the machine is not really dealt with here. For a more detailed technical analysis see Parsons (1939), Carugo (1977), and Curran et. al, *Obelisk: A History* (2009).

state with the original inscription dedicated to Caesar and the bronze orb at its apex. It includes the measurements for the orb and the new pedestal (fig. 2.11).

This drawing, the treatise's only illustration, shows the plan, elevation, and perspectives of the obelisk and the machine that would place it in motion. The accompanying text recounts the formal presentation to Gregory XIII and Mercati. The first stage of the process involves the encasement of the obelisk within the *castello*, a pyramidal sheath of oak boarding surrounded by a framework of iron bars. From the bars, a series of lead chains is connected to this protective framework. Below, a platform of heavy timbers is built, from which the load would be raised. The apparent impregnability of the *castello* is a reflection of his paramount concerns, strength, quality of materials, and integrity of construction. strong and "well-built" since all of the operations would be performed with a single assembly.[151]

The stone would only be raised a short height from its pedestal, before it came to rest on a bed of wool for transport. To perform the lift, oak-fibre cables and pulleys activate four large beams or "wings", arranged as a cruciform in plan. Eight, tapered levers make up each wing, each equipped with a grappling hook to support the iron bands encasing the obelisk. The levers drop from the elevated position—a distance of 32 palms or approximately 7m (shown at a raised angle in the side elevation of the drawing)— to a horizontal position (as in the perspectival drawing).

Once secured within the framework of the *castello*, the obelisk would be ready for transport, raised on a platform atop a set of rolling timbers and moved along a track. To facilitate an uninterrupted transit, the last roller is continuously removed by a pulley and replaced at the

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[151] Agrippa, *Trasportar la guglia*, 11.

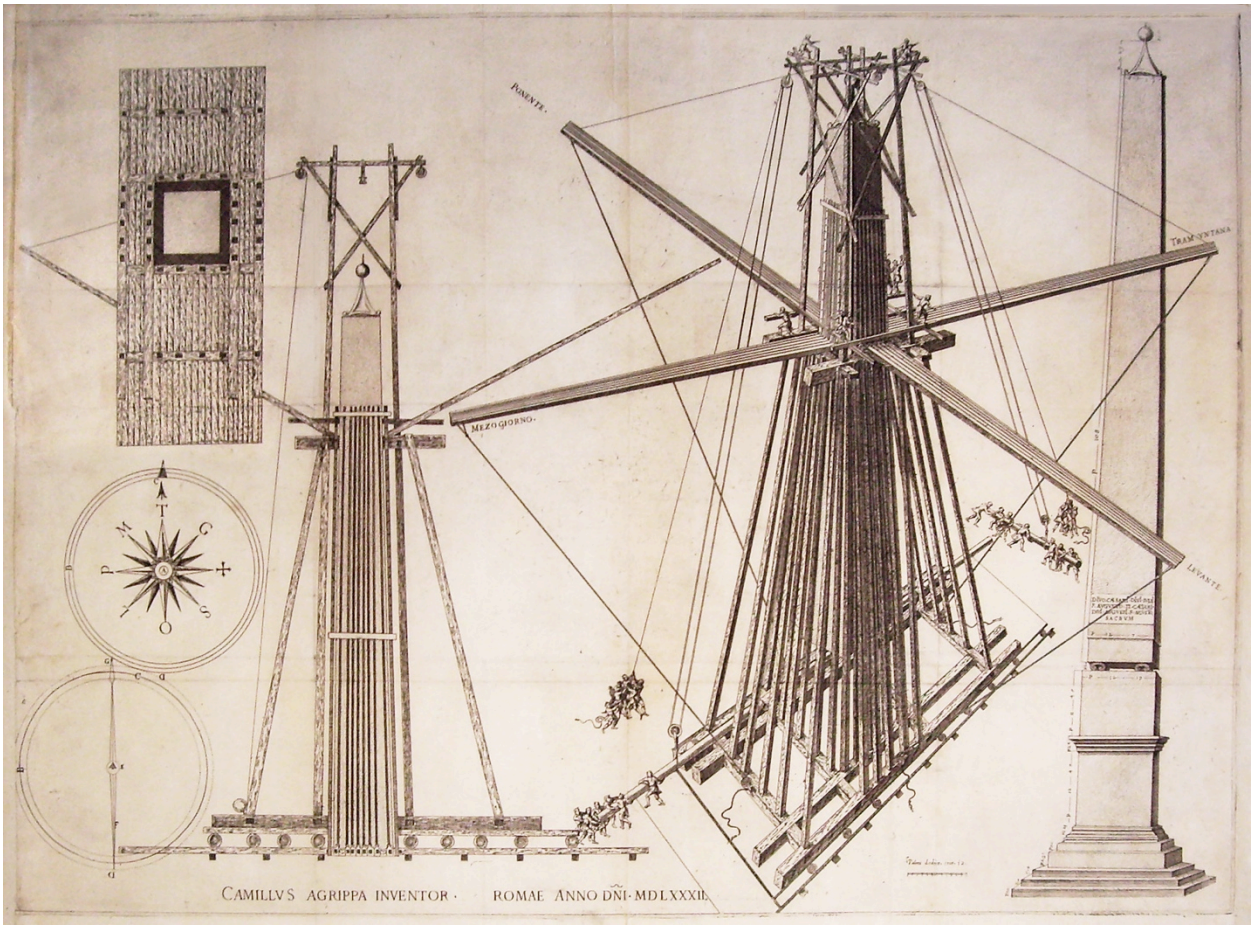

Figure 2.11 Agrippa's proposal for the transportation of the obelisk, 1583. Collection of the CCA, Montreal.

front. Upon reaching its destination, it is raised again and then lowered onto its new pedestal, whereupon the *castello* would be dismantled and removed.

By moving the *guglia* upright and "in the air,"[152] Agrippa reasons that all of the weight will be evenly distributed on the platform. In addition, this solution would mitigate the added risk, complexity and cost of lowering the obelisk into repose. He further addresses the balancing effect of the system of levers. Since the *castello* would accommodate the proximity of the obelisk to the existing Old Sacristy, the base of the machine and platform would be asymmetrical with the obelisk sitting closer to the rear (see plan view of the device fig 2.11). In order to accommodate this eccentricity, the levers would preserve balance by delivering more weight to the front of the apparatus. Further, a quadrature at the *castello*'s top would prevent tilt. Agrippa acknowledges the need for incremental adjustments during the transfer:

> But mainly it is said to show the cleverness of the whole machine, that it can be remedied, making as from the first irons most vigorous and reinforced, and this is the account that you have to have to predict all failure, as befits all men, who claim such a venture.[153]

He went as far as to claim that the assembly would have the stability to "go across a lawn. Because of this, the soil alone will hold it. This machine will do it all. It will lift it, carry it, lift it some more, and finally place it on its foundation."[154]

Trattato di trasportar la guglia primarily focused on the design and performance of Agrippa's machine. If the obelisk were lifted according to these principles the details of its

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[152] Agrippa, (1583),18. "*Essendo, visto il modello, & discorso sopra essa guglia, hora si dichiarano le cause, perche è attaccata & portata in piedi nell'aria, quali sono molte*."

[153] "*ma questo si dice principlamente, per mostrar l'intelligentia di tutta la machina, da poterrimediarci, faccendo dalla parte d'inanzzi li ferri piu gagliardi & rinforzati, & questa e la consideratione, che bisogna havere, per poveder a tutti i mancamenti, come convience a tutti gli huomini, che pretendono tal impresa*." Agrippa, (1583), 21.

[154] Ibid.

transport would not be an immediate problem. The singular machine would execute the moving process in its entirety. It would not require much labour or materials and would lift, lower and move the obelisk to its new destination. It would be a departure from traditional lifting strategies for heavy weights. In spite of the professed expertise, the exposition ends with a conspicuous plea:

> Knowledgeable readers— do not judge too easily, in saying that I have not given reason for raising the obelisk with large and small wheels. Since I know that well, and would do, that a man alone would raise it, and pull it, as you are hearing from my other discourses: so do not be surprised if there are other ways, because you cannot do a thing showing all of your intentions. But I have chosen this method as the best, and safest, easiest, and shortest, as I believe, and now you will know.[155]

Agrippa wanted it to be known that he devised the best method even if the complex coordination required was only given cursory treatment.

THE DIALOGUE ON MOVEMENT

To know motion, is to know nature / ignorato motu, ignoratur natura — Thomas Aquinas

The subject of cosmology and of a motile earth, first presented in the *Scientia d'Arme*, reappears in the philosophical dialogue of the treatise on the obelisk project.[156] One of the interlocutors, Agapito Fossani, directly references the treatise when his brother Fabritio asks about the center of the world: "Don't you remember that this was written in the [*Scientia d'Arme*]

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[155] Agrippa (1583), 7.

[156] The cosmological defence of Agrippa's device appears in the second part of the treatise, in the philosophical dialogue entitled *Dialogo di Fabritio et Agapito Fossani sopra il discorso della guglia fatto da Cambillo Agrippa* (1583), 29-47.

by Camillo Agrippa?"[157] Their exchange serves to explain two diagrams resembling a compass and a windrose that illustrate the relationship of the obelisk moving along the surface of the earth to the planet's center. The obelisk and the machine are part of a grander natural order within the cosmological system envisioned by Agrippa. As the instrument that balances the obelisk, the machine is responsible for establishing the ordering of the cosmos. The four levers Agrippa describes and their representation in the perspective evoke diagrammatic representations of the perfect cosmos.

Moving Earth

At the opening of the philosophical dialogue, the brothers Agapito and Fabritio Fossani[158] are debating the discourse on the obelisk. When asked to describe the most unique parts, Agapito replies, "the first would be the center of the world, which is the natural support of all of the weight, and which supports the machine as well as the obelisk that rests upon it."[159] In addition to identifying the central importance of the concept of the "center of the world", the brothers highlight several other key components:

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[157] *Non vi ricordate ancora che questo e scritto nel trattato della Scientia dell'arme di Camillo Agrippa?*

[158] The two brothers debating Agrippa's treatise on transportation of the obelisk are ficitional characters. Their discussion serves as a jumping off point for Agrippa to intervene and explain how his project works via the diagrams, and also by describing how it can be applied to the lifting of the Column of Trajan.

[159] Agrippa (1583), 29. "*à me pare, che la prima sia il centro del mondo, quale è natural sostegno di tutte le gravezze, sopra il quale ancora s'appoggia la machina, & la guglia che ci sta sopra*."

> The rollers are the conductors and correctors between what is static and what is in motion. The wooden tower [*castello*] is carried, and brings and manages the uncovered obelisk, propped up in the air. The obelisk is what is carried.[160]

Fabritio first identifies these processes and then summarizes them as four actions: one holds it up, one drives it, one maintains its balance, and the final action carries the obelisk but is also carried.[161] By defining the machine's essentials according to four ideal states of movement, Agrippa revisits his analysis of the fencer's body in *Scientia d'Arme*. I contend that Agrippa saw the machine and the body in the same way.

In *Scientia d'Arme*, the fencer's ideal movement originating from the torso is a microcosm for the earth's shifting center. Here, the obelisk's equilibrium depends on the same type of movement. Obelisk and machine need to move relative to the earth's changing center of gravity. He asks the question, "what if the obelisk was transported along the whole of the earth?" to which he replies that the earth's center of gravity would consequently shift. Transferring a heavy weight along the earth's surface will impose corresponding movement of the earth's center. Minimizing that effect while the obelisk is moving will lessen the terrestrial impact. Two diagrams illustrate this principle of motion. The first, three concentric circles, represent the center of the world (A), the earth as a sphere of land and water (B), and the obelisk's path of motion on the earth's surface (see fig. 2.14). In order to demonstrate the motion of a heavy body such as an obelisk, he uses a magnetic needle to show the principle to his counterparts:

> I would take a magnetic needle [lodestone], long and skinny, with the end marked F, and then I would encircle it with iron . . . . Now for our demonstration, we put a small obelisk marked G, on one end of the needle, and then put that needle in equilibrium, so that the

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[160] Ibid. *"I curli sono i condottieri, & rettori tra i stabile, & mobile. Il castello è portato, e porta, è governa la guglia in se nuda, è nell'aria, il portato è la guglia*."

[161] Ibid. "*l'uno regge, l'altro conduce, è sostenta, è l'altro porta, e governa, & è portato, & la guglia e portata, e conservata sicura nell'aria nuda*."

> head of the obelisk is outside of the first circle, and the middle of the needle is placed before A, going out of it first, and afterwards I will turn around, as before, and both ends of the needle describe these circles.[162]

The rotation of the needle traces two circles that are marked on the diagram, one of gravity and one of levity. According to his theory, coordinating the obelisk's movement with these two circles of motion will maintain the system's equilibrium. In order for this to occur the heavier part of the obelisk (its base) must remain as close to the earth's center as possible with the lighter part (its tip) moving away from that centre. The machine would preserve this cosmological alignment of the obelisk and the centre of the world. Although Agrippa's only vaguely demonstrated the relationship between his theory, his device and his experiment, he does establish through his treatise that his concept of the machine is based on his ideas about heavy bodies and the motility of the earth.

Moving Air

Agrippa regards his machine as an instrument for dealing with natural phenomena. In his drawings and descriptions, the movers of the obelisk—the levers— and their violent motions — are described as the four major winds: *mezzogiorno*, *levante*, *tramonta* and *ponente*. While also conventional representations of the cardinal directions, they have an affinity for the similar rhetorical devices published works of the papal astronomer and cosmographer, Ignazio Danti.[163] In particular, Agrippa's rings describing the motion of the obelisk over the earth (see lower lefthand corner of fig. 2.11) parallel Danti's diagram of concentric circles located on the vaulted ceiling of the Meridian Hall in the Tower of the Winds (fig. 2.12). Such diagrammatic

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[162] Agrippa, *Dialogue*, (1583), 30-1.
[163] One example would be the armillary spheres in Danti's translation of Proclus.

representations of winds are part of a long tradition in medieval cosmography that bridged natural phenomena with the sublunar and celestial worlds.[164]

In 1584, Agrippa published a treatise dedicated to the movement of winds, *Dialogo di Camillo Agrippa Milanese sopra la generatione de Venti, Baleni, Tuoni, Fulgori, Fiumi, Laghi, Valli, & Montagne*.[165] His observations on natural phenomena were indebted to the entrenched Aristotelian tradition, as shown when Agrippa explains the generation of winds on earth as a process of exhalation:

> [...] from the motion out of which all other things are born, the winds are also born. [...] the motions of the heavens, and the stars still move the four elements, and from those motions is born the exhalation, from the exhalation the various kinds of winds.[166]

In the dialogue of *Trattato di trasportar la guglia*, there is a related allusion to the winds in which Agapito assigns the cardinal directions to the four wings of the device (the levers): "I will label the four wings by name, one east, the other west, the other north, and the other south, as they are with respect to the heavens."[167] Within the medieval cosmic order, winds are an irregular and unpredictable phenomenon of the terrestrial world. The four major winds however, when represented as the cardinal axes, are more associated with a principle of cosmic order and stability.[168] Agrippa provides the levers on his machine to adjust and to respond to the movements of the obelisk and of the earth. In the dialogue Agapito describes this process when

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[164] For a discussion of wind diagrams and cosmology see Barbara Obrist, "Wind Diagrams and Medieval Cosmology" in *Speculum*, Vol. 72, No. 1 (Jan. 1997), pp 33-84, where she examines the role that wind diagrams played in the representation of medieval cosmological ideas.

[165] Published in Rome, Bartolomeo Bonfadiono and Tito Diani, 1584.

[166] Agrippa, (1574), 5-6.

[167] "*Io segnarò le quattro ale per nome, l'una levante, l'altra ponente, l'altra tramontana, & l'altra mezzo di perche cosi stanno rispetto al cielo. Et questo sara il modo di portarla à destra, à sinistra, inanzi, à dietro.*" Agrippa, (1583), 34.

[168] Obrist, (1997), 38.

he states that, "If the obelisk will be eastward, I would lower the western wing, and if it would be westward, I would lower the eastern wing."[169] Agrippa's instrument adapts the act on earth to the higher order natural phenomena of the sublunar world, thereby maintaining its proper place in the cosmic order.

The apparatus for adjusting the movement of the obelisk closely resembles a drawing of an Ignazio Danti's anemoscope. Published in 1578, Ignazio Danti's *Anemographia* (written in 1576) outlined his invention for a vertical anemoscope. In 1580, the same year that Agrippa presented his model to Gregory XIII in the *Metallotheca*, Danti was commissioned to design the papal apartment and observatory in the Belvedere Court, known as the Tower of the Winds.[170] The project included the anemoscope to track the movement of the winds, and a meridian line for marking the solstice. The new design was for a horizontal anemoscope, which unlike the earlier design could track wind movement perpendicular to the ground plane (fig.2.13). This later device appears to have inspired Agrippa's lever system.

Although no record points to an official collaboration between Danti and Agrippa on the obelisk, it seems likely that their associations with Gregory XIII in the late 1570s could have placed them in mutual spheres of influence.[171] Agrippa must have been aware of Danti's work on

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[169] *Aga. Se la guglia sarà verso Levante, io faro abbassare l'ala di Ponente, & se sarà in Ponente, io faro abbassare l'ala di Levante* [...]. Agrippa, *Dialogo*, (1583), 34.

[170] Nicola Courtright, *The Papacy and the Art of Reform in Sixteenth-Century Rome: Gregory XIII's Tower of the Winds in the Vatican* (Cambridge: Cambridge University Press, 2003) and Jacks, "Sacred Meta," (1989), 152-3. The connection between Danti's anemoscope and Agrippa's device was inspired by Eric Solomon Toker,"An Architectural Excursus into the Site of Becoming: Domenico Fontana's *Della trasportatione dell'obelisco Vaticano.*" Master's thesis, McGill University, 1998.

[171] The *Biography of the Italians* states that Danti had collaborated with Domenico Fontana's brother Giovanni, and with Giovanni again along with Camillo Agrippa on translation of the Vatican obelisk.

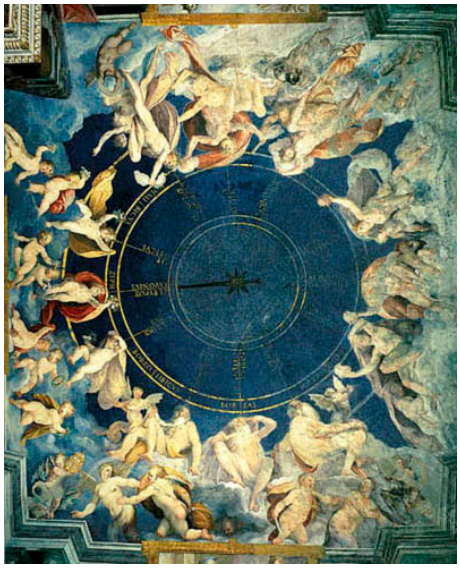

Figure 2.12 Ignazio Danti's ceiling for the Tower of the Winds. In Courtright, Nicola. *The Papacy and the Art of Reform in Sixteenth-Century Rome: Gregory XIII's Tower of the Winds in the Vatican*. Cambridge, UK: Cambridge University Press, 2003.

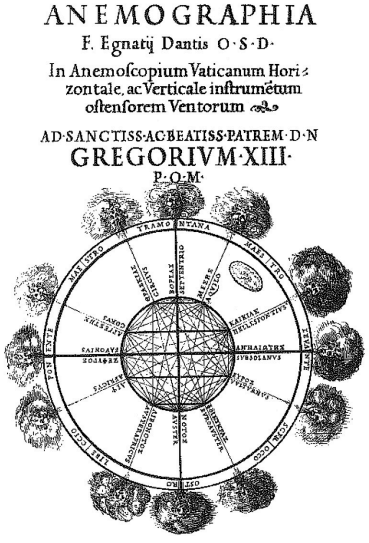

Figure 2.13 Ignazio Danti's device for an anemoscope. Anemographia… in Anemoscopium Vaticanum Horizontale, ac Verticale instrumentum ostensorem. *Cod. Vat.lat.5647,* frontispiece. In Philip Jacks, "A Sacred Meta for Pilgrims in the Holy Year 1575," *Architectura* 19, no. 2 (1989), p.152.

the Tower of the Winds and the Meridian Hall. Sixtus V also had a propensity for taking up Gregory XIII's waylaid plans. Further, historical accounts indicate that the pope summoned Danti to Rome to work on the translation of the obelisk. It is also known that Danti collaborated with the brother of Domenico Fontana, Giovanni. Mercati's authoritative account singled out Agrippa's audience with Gregory XIII for the plans to move the Vatican obelisk. And Agrippa emphatically states he had been debating the project for over thirty years. It seems likely therefore, that Danti was at least somewhat involved in the conception of Agrippa's scheme.

Camillo Agrippa's writings illustrate the fascination with movement during the inception of Domenico Fontana's project. Beginning in the mid-sixteenth century with *Scientia d'Arme*, Agrippa applied his cosmological picture to the practical analysis of the art of fencing. Using a geometrical system that references the cosmos, Agrippa demonstrated that the motion of the human figure and the sword in action approximated the earth's movability at the centre of the cosmos. When he applied these ideas to the moving of the Vatican obelisk, the relationship between his technique and his cosmology persisted. His treatise, *Trasportar la guglia*, not only documents his proposal for the project, but demonstrates his drawings and machines as cosmological devices. They indicate the centrality of the Aristotelian tradition and Oresme's cosmology for understanding the conditions and effects of designing a machine in the sixteenth century. Such an analogy between the design of instruments and the observation of nature is paralleled in the writings and inventions of the papal cosmographer Ignazio Danti. These greater concerns suggest that the obelisk project, and its movement, was understood both pragmatically and metaphorically within the conception of nature and the cosmos.

Agrippa's design of the machine and his explanation of how it operates in cosmological terms are important precedents for Fontana's realization of the project. Although Agrippa takes

on a decidedly different role than Fontana who approaches the project as coordinator and architect, his inventions and writings show that in its inception, there was more to the transportation of the obelisk than a technical achievement. Agrippa shows an understanding of the machine and the action of moving the obelisk as somehow changing the universe. In its first iteration, the project for moving the Vatican obelisk was understood as an undertaking that needed to be done in such a way as to not disrupt the cosmological order.

CHAPTER 3

BECOMING THE *CONDUTTORE*

> "Let all the movements be restrained and gentle, and represent grace rather than remarkable effort." – Leon Battista Alberti, *On Painting*[172]

At the end of the sixteenth century, contemporary humanists increasingly sought the wisdom of Archimedes to lend ancient authority to the pursuit of a mechanical theory that was in its ascendency.[173] The myth of Archimedes, as a fabricator of wonders but, more importantly, a revealer of truths about nature, made it possible to see beyond political and military strategy to conceive of machines for the contemplation of the cosmos. Fontana's narrative in *Della trasportatione* builds upon this sensibility. In this chapter I examine the details of the events leading up to the project's realization, in order to elucidate how the Vatican obelisk project exemplifies the changing relationship between theory and practice. Fontana strategically demonstrated the concept of the architect as a technical expert and organizational authority by framing the obelisk competition as performance. We find the strongest advocates of a mechanics disassociated from the concept of manual labour, in Guidobaldo del Monte's *Mechanicorum Liber* (1577), and Filippo Pigafetta's Italian translation of it, *Le mechaniche* (1581).

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[172] Leon Battista Alberti, *On Painting and On Sculpture*, trans. Cecil Grayson, Book II, 81.

[173] The legend of Archimedes played a significant role in the changing conception of mechanics in the sixteenth century. W.R. Laird tracks this phenomenon in "Archimedes Among the Humanists," *Isis* 82 (1991): 628-38. For the impact of the Archimedean myth on humanist concepts of the mechanical arts, see Jessica Wolfe, *Humanism, Machinery, and Renaissance Literature* (Cambridge: Cambridge University Press, 2004), 29-55.

As with other contemporaneous literature on the 'art of moving weights,' *Della trasportatione* refers to the fabricator and operator of the machine as *artificio, ingegnere, inventore, architetto,* and *mechanico.*[174] The alternating use of these terms points to a complex understanding of the architect's role in this literature. The jury sought a candidate for the relocation of the obelisk with proven experience and the capacity for *invenzione* and *ingegno*. The medieval term "*ingegno"* defined a physical machine, the intellect of an inventor, or one who possesses a subtle mind. In this context, Fontana's undertaking would require *ingegno* in its broadest etymological sense—demanding the inventor's intellect and the prowess of the coordinator. Further, as conductor of operations, Fontana would control and devise the method of construction, the organization of labour, and the unfolding of the event. Consequently, the scope of his work would assume a corresponding breadth as we consider how the building site (*cantiere*), the works of St. Peter's (*fabbrica*), the city and its inhabitants, became extensions of a holistic machine.[175] Fontana thus assumes the emergent role of the architect as one who combines the efforts of the technician, coordinator, and artificer.

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[174] Sixteenth-century writings on the Vatican obelisk project, including Fontana, *Della trasportatione* (1590), Mercati, *Gli obelischi di Roma* (1586), Pigafetta, *Discorso* (1586), and Agrippa, *Trattato di trasportar la guglia* (1583), use these terms interchangeably, indicating the different concepts of architect/mechanic/technician that the architect was thought to embody.

[175] I refer here to Alessandro Biral and Paolo Morachiello's discussion of the terms *ingenium* and *ingegnere*, and the medieval association of the building site as a mechanism to be designed and controlled, in *Immagini dell'ingegnere tra Quatrro e Settecento: filosofo, soldato, politecnico* (Milan: Franco Angeli, 1985), 11.

THE COMPETITION TO MOVE THE VATICAN OBELISK

Most scholarly accounts of the competition rely heavily on the recollection of events from *Della trasportatione*.[176] Fontana likely felt the need to publicly defend his victory with his own version of events in *Della trasportatione*. Although he did not accurately recount how he won the commission, he used his treatise to frame his transformation into the architect. Within four months of taking power, Sixtus would delegate the call for proposals to the Congregation of Bridges, Streets and Fountains, which was made up of prelates and city officials. The first assembly of the selection committee occurred on August 25, 1585 lead by Cardinal Donato Pier Cesis along with cardinals Filippo Guastamiliano, Ferdinando de' Medici (the future Grand Duke of Tuscany) and Francesco Sforza.[177] Other representatives included a treasurer, two officials of streets and roads, a senator, conservators, a commissioner of fountains, and a public revenue inspector.[178] As he describes it, the Congregation had three primary considerations: the position of the obelisk relative to the front of the basilica, the most prudent and safest method of transport, and the choice of *artificio*, a role Fontana described as one "whom they judged most capable of reason of both intelligence and experience in similar affairs, of leading the project to

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[176] Modern sources on the Vatican obelisk project revisit Fontana's account. The most thorough account of the *congregazione* and the *concorso* include Cesare D'Onofrio,'s analysis of the accuracy of Fontana's version of events, in *Gli obelischi di Roma* (1992), 145-58. Also see Curran et al., *Obelisk a History* (2009) and Carugo (1977) for attributions and technical accounts of the projects.

[177] In *Della trasportatione*, Fontana states that Sixtus appointed the commission himself. Pamela Long points out that the Congregation of Bridges, Streets and Fountains was an organization that met regularly since the time of Pius V, 1567 (see Curran et al*, Obelisk a History*, 2009), 114.

[178] Fontana records the names of the attendees and their official positions in *Della trasporatione* (1590), fols. 4v-5r.

its desired end."[179] Further, the *artificio* should possess knowledge to easily overcome the high stakes of disturbing "the rarest of gems alone remaining intact among so many ruins of Roman magnificence".[180] Cesare Ripa's book of emblems, the *Iconologia* (1604) offers a revealing allegory of *Artificio* (fig. 3.1).[181] Wearing the garb of a courtier, *Artificio* stands confidently with his hand on an *argano* (winch), the *Artificio* is shown in deft control of machine and nature through seemingly effortless gestures and movements.

Fontana drew upon the project's famed history of failure to ennoble himself:

> The matter had defeated the daring of many former pontiffs who had wanted to transport the same stone. To this were added a thousand doubts because of the obstacles they had encountered, given that no ancient text or account had yet been discovered (as I have remarked) of the methods used then, from which a proven rule, one that no one would oppose, might be extracted.[182]

To overcome the longstanding fears about the massive undertaking, the papal commission announced a competition by inviting experts in the 'art of moving weights' to develop proposals.[183] On September 18, 1585, after an adjournment of twenty-five days, the commission reconvened to review the candidates at the residence of Cardinal Cesis in Rome. Fontana would

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[179] Fontana, fol. 4v; and Sullivan, trans. (2002), 9. The English translation of *Della trasportatione* translates *artificio* as "artisan", which I argue does not adequately reflect Fontana's understanding of the concept.

[180] Ibid.

[181] Cesare Ripa, *Iconologia*, Padova: Pietro Paolo Tozzi, 1625. This volume appeared nearly two decades after the Vatican obelisk project was completed. The famous event took place in April and then September 1586, involved Fontana's command of dozens of these *argani*, in a choreographed display during the obelisk's lowering and then raising.

[182] Fontana, fol. 4v; Sullivan, trans., 9.

[183] Cesare D'Onofrio meticulously analyzes these details in his treatment of Fontana's appointment in *Gli obelischi di Roma* (1992), 145-58.

have demonstrated his model before five hundred peers, including artists, scholars, engineers, and architects hailing from locations as far away as Rhodes and Sicily.[184]

Beyond Camillo Agrippa's submission, only a few of these proposals are known in some detail.[185] One candidate, an engineer from Cesena name Francesco Masini would publish *Discorso. . . sopra un modo nuovo, facile, e reale di trasportar. . . la guglia...* in March 1586 (fig. 3.2). Little is known about Masini, who had expertise in the fields of hydraulics, architecture and agronomy, but his treatise reveals some of the innovation and much about the spirit of the contest. Masini would have used water to counter a reliance on machines, which he deemed marvellous but untrustworthy.[186] By moving the obelisk upright on a raft and floating it to its new location along a canal he also claimed to eschew the rivalry that plagued the project (see fig. 3.3).

> I did not write this Discourse, nor send it for printing, to compete, or compare myself to other valiant men who have written about this subject; and also have in their hands the Guglia, to lead it to the Piazza San Pietro. And they, since having thought about it not only for months, but for years and years, whereas I almost in an instant came upon it, but only to express my opinion whatever that may be and to demonstrate the great ease and small expense that would be involved in carrying out this task that is so beautiful, and important.[187]

Vincenzo Scamozzi, did not really take Masini's proposal or his theoretical defense of it seriously. Decisively, Scamozzi "left behind" waterborne proposals in favour of those he could

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[184] Historians largely assume Fontana's number to be an exaggeration.

[185] Some of the proposals will be discussed here. Fontana did not name any of these *artifici* other than his temporary supervisors Bartolomeo Ammannati and Giacomo della Porta.

[186] Masini states that he wants to exploit the strength of nature, citing that the marvels and the war machines of Archimedes are wondrous to be sure, but that this would be too risky to raise the *guglia*, in *Discorso*, (1586), fol. 29v.

[187] My translation, Masini, (1586) fol. 27v.

Figure 3.1 *Artificio*, Cesare Ripa's *Iconologia*. Padua: Pietro Paolo Tozzi, 1625.

classify by principle of the lever, wedge, or screw.[188] Similarly, Fontana's solution, as an amalgam of the fundamental principles, had no inherent originality for Scamozzi. However, his treatment recounts the remarkable variety and technical virtuosity of the competition on the whole. In his treatise *L'Idea della architettura universale* (1615), he recalls the obelisk competition as a site of invention and technical virtuosity,

> we do not ever intend already in this our work to prejudice anyone, estimating the honor of all, like the pupil of our eyes, all that labored over this subject Antonio Sangallo, and Giacopo Vignola, and Bartolomeo Ammanati, and Giacomo della Porta, and Camillo Agrippa, and Oratio Marii, Domenico Fontana, and many others; most of which we have known in various times, that we were in Rome.[189]

The diversity of inventions for transporting the obelisk so fascinated Scamozzi in his formative years, that he later devoted a section of his book on machines to the Vatican project. He describes a number of the machines that he claims to have witnessed in 1579 as a young man in Rome. Each device corresponds to a model Fontana reproduced in *Della trasportatione*.[190] For Scamozzi, the figure of *ingegno* was driven as much by the culture of rivalry in Rome as innovation surrounding the obelisk. His account does not mention the meetings of the Congregation or the resolution of the competition, except to say that the problem of how to successfully move the obelisk had been laboured over by many *elevati ingegni*.[191]

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[188] My translation. Scamozzi, *L'Idea della architettura universale*, Parte Seconda, Libro Ottavo, Cap. XIX, fols. 336r-338r.

[189] Ibid.

[190] Scamozzi describes the following mechanisms: the long lever (F in the plate 8R); inclined screws (E); the use of vertical screws to lift the obelisk and horizontal screws to move it (H); a cogwheel (G); a half-wheel [C]; wedges [D]; and finally Agrippa's [B] and then Fontana's [A].

[191] Scamozzi described Fontana's method and mentioned him as among the "elevated experts", but he did not give Fontana recognition for executing the task, (1607), fol. 336r.

DISCORSO
DI FRANCESCO
MASINI SOPRA
VN MODO NVOVO, FACILE,
E REALE, DI TRASPORTAR SV LA
PIAZZA DI SAN PIETRO LA GVGLIA,
ch'è in Roma, detta di Cesare.

AL MOLTO ILLVSTRE, ET REVEREN-
dissimo Sig. & Patron mio Colendiss. Il Sig. Adouardo
Gualandi Vescouo dignissimo di Cesena.

CON LICENZA DE SUPERIORI.
In Cesena, Appresso Bartolomeo Rauerij. L'Anno 1586.

Figure 3.2 Title page for Francesco Masini, *Discorso di Masini Sopra un modo nuovo, facile, e reale, di trasportar la su la piazza di San Pietro la guglia.* Cesena, Bartolomeo Raverij, 1586. BiASA.

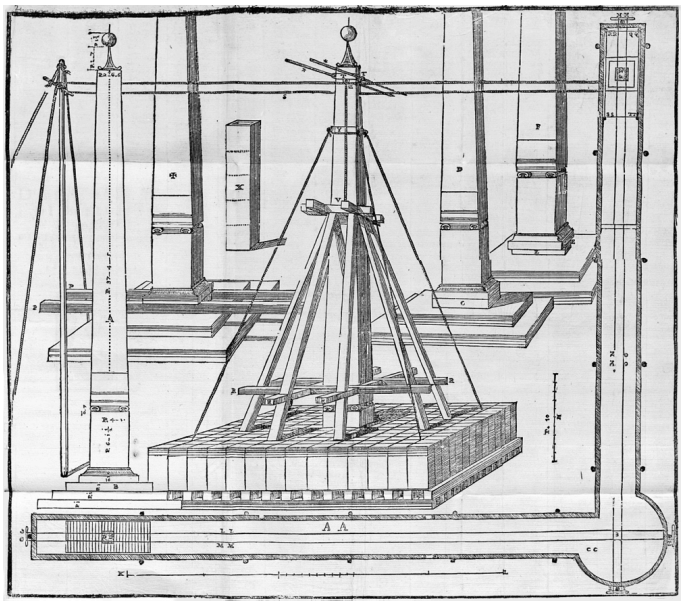

Figure 3.3 Masini's waterborne device for moving the obelisk upright. *Discorso di Masini Sopra un modo nuovo, facile, e reale, di trasportar la su la piazza di San Pietro la guglia.* Cesena, Bartolomeo Raverij, 1586. BiASA.

A Theatre of Machines

At the beginning of *Della trasportatione*, Fontana presents the models of his competitors on a single drawing (fig. 3.4). The image adopts the same visual language as sixteenth-century machine books and shares the contemporary attitude to the display of technical knowledge and the machine's analogy with artifice. In addition to showcasing the technical solutions for the obelisk's removal, the image documents the obelisk's environment before the move. The engraving sets the obelisk in its original location in the small piazza next to the Old Sacristy. Fontana's machine hovers above the fray, supported by winged cherubs. The other devices are not shown statically but in action with each one moving a small replica of the obelisk. These machines, Fontana states, are reproduced for the edification of the reader. He declares them "among the best presented to the commission" and that each one was "based on sound reasoning."[192] The inventors are not identified in his text, but a few can be surmised. Model B for example is unmistakably Camillo Agrippa's device with its four giant horizontal levers; model H has been identified by Eric Iversen as Antonio Sangallo's proposal;[193] the solution marked F, shows the same screw mechanisms Aristotele Fioravanti and Francesco di Giorgio Martini applied in their machines for moving heavy weights.[194] The steelyard of this latter device is also reminiscent of the machine for moving an obelisk upright illustrated in Jacques Besson's *Theatrum Mechanorum.* However, rather than representing specific designs, the engraving

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[192] Fontana, *Della trasportatione*, fol. 7r; Sullivan, trans., 15.

[193] Iversen states that only Fontana, Agrippa and "probably Sangallo" can be identified. He cross-references Carlo Fontana and Scamozzi but I have not found any other evidence of this device being attributed to Antonio Sangallo. See Iversen, *Obelisks in Exile*, vol. 1 (1968), 30.

[194] Adriano Carugo provides a comprehensive study of the devices and how they derived from ancient sources in "Obelisks and Machines" (1978), LXXIII-LXXIV. Also see Gustina Scaglia, "Drawings for Machines for Architecture from the Early Quattrocento in Italy" *JSAH* 25, no.2 (1966): 90-114.

functions more as a visual catalogue for the standard ways to move objects during this time — wedges (D), a giant lever (F), a cogwheel (G) and screws (H). Fontana enforces their anonymous origins.

Fontana also suggests that transporting the obelisk in an upright position was a facile attempt by rivals to mitigate risk. Even fewer entries dared to lower the monolith into a prone position due to its immense size combined with its weight and that of the hoisting machinery. He stresses that only he proposed to lower the obelisk into a prone position, drag and then re-erect it in stages because he was inspired by the work of the ancients. Of the seven devices he illustrates in the drawing, there is one that opts to lower the obelisk on its side by balancing it on a half wheel (model C), and a second that lowers it using screws so that can be moved in an inclined position (E). The remaining proposals maintain the obelisk's vertical position throughout its transportation. All of the devices in the plate however, focus on the moment of raising the obelisk (using levers, steelyards, screws or other mechanisms) without developing solutions for the translocation of the stone or the organization necessary to make the move possible.

Machine books provided mechanical drawings derived from both ancient and contemporary sources to a wider audience and thus provided fertile grounds for experimentation and the demonstration of knowledge.[195] The competition plate from *Della trasportatione* adopts the same language of representation as these theatre-machine books. Fontana's models are shown from an aerial view, with device and components exposed. He labels each device and

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[195] Cesare D'Onofrio states that Fontana represented his competitors' models because it was customary to do so at the time. Framing the drawing's intentions in this way, takes for granted *Della trasportatione*'s relationship to the expanding interest in machines and their visual representation in the late sixteenth century. In *Gli obelischi di Roma* (1992), 148.

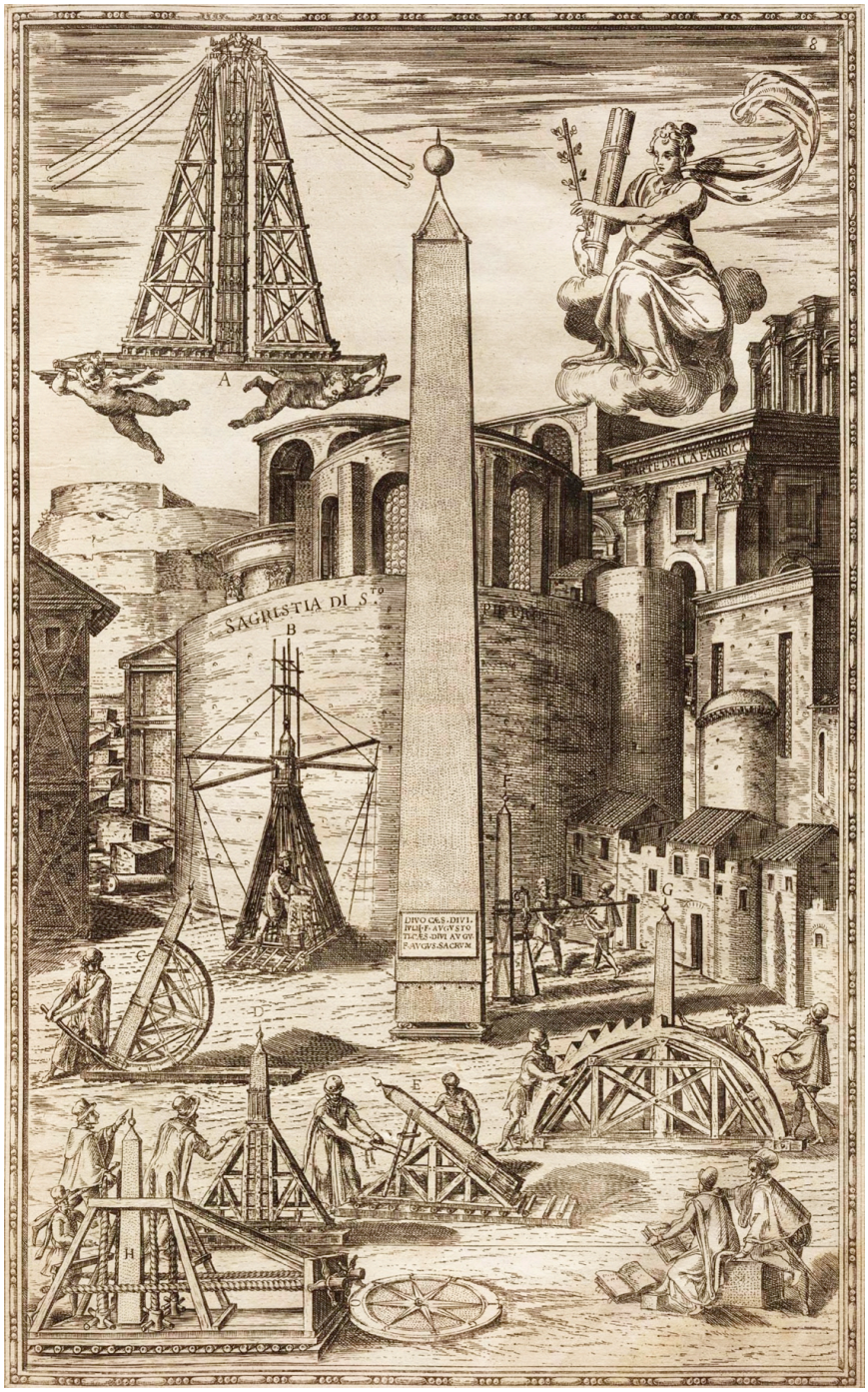

Figure 3.4 Devices for the competition to move the Vatican obelisk, fol.8r. *Della Trasportatione dell'Obelisco Vaticano*. Digital facsimile from the copy in the Library of Congress. (Oakland, Octavo, 2002).

supplements each with a brief description of how each part works.[196] As in the staged representations of a machine book, the emphasis in the image is placed on the device itself, without comment about its implementation. Fontana leaves the organization, coordination and confrontation with the embodied task of moving, out of the image.[197]

Fontana's Demonstration of the Model

When Agostino Ramelli published *Le diverse et artificiose machine* (Paris, 1588), he wanted to "send into the light [a] rich treasure of machines and instruments" in order to "benefit the world."[198] A visual encyclopedia of technical knowledge, it presented devices that "[had] been constructed or [were] yet to be built in the future".[199] Along with Jacques Besson's *Theatrum Mechanorum* (1571-1572), Ramelli's publication incited a greater propensity to share inventions in a space of performance. Traditionally dubbed 'theatres of machines' these volumes created a spirit of openness and cooperation among theorists and practitioners. Fontana joined this intellectual movement at its height when he published *Della trasportatione*.[200] Following

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[196] For more on the development of forms of representation in machine books see Marcus Papplow's essay, "Why Draw Pictures of Machines? The Social Contexts of Early Modern Machine Drawings" in *Picturing Machines 1400-1700*, ed. Wolfgang Lefèvre (Cambridge, MA.: MIT Press, 2004), 17-48.

[197] The later illustrations of the 'machine' that depict its coordination, occupy a completely different space of representation.

[198] For the English translation of *Le diverse et artificiose machine* (Paris, 1588) see *The Various and Ingenious Machines of Agostino Ramelli: A Classic Sixteenth-century Treatise on Technology,* trans. Martha Teach Gnudi (New York: Dover, 1976), 53.

[199] Ibid.

[200] For a discussion of the role that Theatres of the Machines played in the dissemination of the developing mechanical culture of the sixteenth century see Kenneth J. Knoespel, "Gazing on Technology: *Theatrum Mechanorum* and the Assimilation of Renaissance Machinery," in *Literature and Technology*, eds. Mark L. Greenberg and Lance Schachterle (Bethlehem: Lehigh University Press, 1992), 99-124; and Alexander Keller, *A Theatre of Machines* (London: Chapman & Hall, 1964) and "Mathematics, Mechanics and the Origins of the Culture of Mechanical Invention," *Minerva* 23, no. 3 (September 1985): 348-361.

Ramelli's advice, he illustrates machines—as "living figures, together with their operations and astonishing effects".[201]

Della trasportatione recreates not only the devices but the mode of their demonstration as well. During the selection process, the competitors presented their inventions before the officials of the *congregazione*. According to Domenico, these propositions followed a variety of formats, but none expressed the same vitality of his act of moving the obelisk with his model. Some used drawings, others maquettes, some had written their proposals, and still others had the audacity to present them orally. Camillo Agrippa had displayed his working model of the *guglia* before Gregory XIII, in an effort to convince the skeptical pope of its feasibility and strength. In Fontana's illustration, Agrippa is standing before his model presenting a drawing, while noblemen enrapt in dialogue peruse the devices on display. In the foreground of the plate, Domenico Fontana surveys the entire scene, arm outstretched as if pointing out the more noteworthy features to the reader. His 'demonstrative' gesture is a recurring motif throughout the *Della trasportatione* illustrations that reinforces his mastery of the project.[202]

Fontana's treatise establishes his prowess as *inventore* and *conduttore* through his own demonstrative powers. In his 1521 commentary of Vitruvius' *Dieci Libri*, Cesariano emphasizes that the best gauge of the architect's knowledge is through his ability to demonstrate rather than

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[201] Ibid.

[202] The ceremony of presenting models has been represented in images of the practicing architect from this period, as in for example *Michelangelo Presenting his Model to Pope Paul IV* and Giambologna's *Buontalenti Presenting the Grand Duke Francesco de' Medici with the Model of the Facade of Florence Cathedral*. See Henry A. Millon, "Models in Renaissance Architecture" in *Italian Renaissance Architecture from Brunelleschi to Michelangelo* (Thames and Hudson, 1994), 18-73.

use words.[203] As tangible evidence of practical experience, the model "had more power of signification than things denoted on a flat surface."[204] Both Cesariano and Daniele Barbaro, sixteenth-century Italian commentators on Vitruvius, revered the machine's potential to demonstrate the architect's theoretical knowledge and experience. Fontana asserted his authority as the architect of the *guglia* through his demonstration not only of his own work but also the work of his competitors.

Presenting models was a longstanding tradition of architectural competitions, and played a role in the construction of the cathedrals of Florence, Milan, Como and Bologna.[205] Since the fifteenth century, the model was increasingly used for design and construction.[206] Filarete's *Trattato* describes a new reliance on the model and its benefits when he advocates making a scaled replica in wood as an excellent way to present an idea to a patron.[207] In the context of the architectural competition, the model served to gauge the potential for a project's success, and aided in the construction of an entire building or its components. There is less historical evidence of a similar use of models in competitions for the design of machinery for architecture or urban

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[203] For a more thorough discussion of the concept of "demonstration" and its relation to theory/practice in Cesariano and Barbaro's commentaries on Vitruvius, see Pamela Long's PhD dissertation, "The Vitruvian Commentary Tradition and Rational Architecture in the Sixteenth Century: A Study in the History of Ideas," University of Maryland (1979); also her more recent work including *Artisan/Practitioners and the Rise of the New Sciences 1400-1600* (2011).

[204] "*Conseguamo enigmatamente vel ambagineamente essa umbra de la cosa e non lo effecto. Et perho e talhora meglio sapere la cosa significare che dire."* English translation of Cesariano from Pamela O. Long, PhD diss. (1979), 102.

[205] A good discussion of the use of presentation models in the context of cathedral competitions is Richard A. Goldthwaite's *The Building of Renaissance Florence: An Economic and Social History* (Baltimore: John Hopkins University Press, 1980) 53.

[206] Millon, "Models in Renaissance Architecture" (1994), 18-73.

[207] Filarete, Grassi, ed. 1972. I: 40.

works.[208] However civic building projects like the construction and repair of cathedrals often required models of the machinery used for hoisting equipment. From this usage, it can be assumed that models of machines were also used to persuade patrons, were admired as objects of wonder, and served more generally as material evidence of a machine's efficacy.

In the case of the Vatican obelisk project, the scale model needed to perform the movement without damaging the obelisk. Fontana emphasized that he executed the transportation in a manner that differed substantially from the proposals of his competitors. He commissioned a cast lead replica of the obelisk, approximately two feet high, and a wooden model of the *castello*, fitted with all of its rigging.[209] With this maquette he gracefully performed the transportation before his audience:

> I brought my wooden model, within which was a *guglia* of lead in proportion to the cables, blocks, and smaller members of the same mode, which were to lift it. In the presence of all the Signori of the *congregatione* and of the aforementioned Masters of the Arts, I raised this *guglia* and lowered it by degrees, demonstrating with words and step-by-step the reason and foundation of each movement, in order and then in action.[210]

Fontana exceeded the practical demonstration of his competition by theatrically animating his model.

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[208] Marcus Papplow has attempted to provide an overview of the use of models in the context of "engineering" projects from the Renaissance to the early modern period. See "Models of Machines: A 'Missing Link' Between Early Modern Engineering and Mechanics?" *Preprint* 225 (Bern: Max Planck Institute for the History of Science, 2002).

[209] The *Reverenda* paid for the model. It was made by Colantonio Liante, who was compensated 25 scudi on the 5th of September, 1585, for "making a model of the obelisk". *ASR, Busta 1527, Fasc. 49* (7).

[210] Fontana, *Della trasportatione*, fol. 5r; Sullivan, trans., 10. The passage reads in the original Italian as follows: "*Io portai il mio modello di legname dentrovi una Guglia di piombo proportionata alle funi, traglie, e ordigni piccolo del medesimo modello, che la doveva alzare, & alla presenza di tutti quei Signori della congregatione, e de sudetti Maestri dell'arte levai quella Guglia, e l'abbassai ordinatamente mostrando con parole a cosa per cosa la ragione, & il fondamento di ciascuno di quei movimenti, si come seguì poi apunto in effetto*."

The display of machines and the demonstration of knowledge in Renaissance culture relates to the concept of *sprezzatura.* In *Humanism, Machinery and Renaissance Literature*, Jessica Wolfe writes about spectacular machines and technology as a form of political artifice and subtlety. At the fourteenth-century court of Urbino, machines were symbols of court dealings and metaphors for the nature of politics. In that arena the demonstration of machines centered on a "concealment of power", to use Wolfe's term, which was simultaneously a suppression of any outward display of effort.[211] In Fontana's *Della trasportatione*, the effortless mastery of his competitor's demonstrations merged within his theatrical movement of the obelisk before the audience. His model allowed him to show the sequence of operations as the obelisk was raised, lowered and transported, while secretly pointing out the inventor's cunning use of *ingegno* as a technique of persuasion. In the end Fontana's was "chosen and approved by the consent of the entire commission for transporting the obelisk, leaving all others aside."[212] But Fontana's real strength hid in plain sight, and it was through his mastery of performance that he was able to emerge as the project's captain or *conduttore*.

FONTANA TAKES COMMAND

The *congregazione* assembled a shortlist comprised of seven candidates: Antonio Ilarione Ruspoli, Domenico Fontana, Giacomo della Porta, Giacomo del Duca, Giovanni Fontana (Domenico's brother, the hydraulic engineer), Tribaldesi (favored by Cardinal de' Medici) and Ammannati.[213] A source document, dated September 25, 1585, in the Roman State Archives for

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[211] Wolfe (2004), 29-33.

[212] Fontana, fol. 5v; Sullivan, trans., 11.

[213] The fact that the Cardinal de' Medici favoured Tribaldesi is indicated by Pastor, vol. 22, where he refers to a letter found in the Gonzaga archives, 250.

the *Congregatione super viis Pontibus et Fontibus*, records the contenders' names and their bids.[214] Modern scholars presume that the commission distinguished these finalists because of their close connections to important members of the jury. Domenico had the highest bid at 16,500 scudi, followed by the Florentine Francesco Tribaldesi, at 14,000 scudi. The lowest bid came from a student of Michelangelo, Giacomo del Duca of Sicily, for 7,000 scudi. Neither Ammannati nor Giacomo della Porta, the latter being the head architect of Saint Peter's, proposed a contract, but both wanted to supervise the works and be paid for the associated costs. Domenico feigned pleasure that the Congregation chose his model while charging Bartolommeo Ammannati and Giacomo della Porta with its execution, but he was disappointed by the committee's oversight to his true expertise. In the end, Fontana managed to convince the jury that he was the only person capable of realizing the project.

Domenico Fontana's appointment to the task of moving the Vatican obelisk was mired in controversy from the outset. A jury panel of officials chose Fontana's method but they denied him the opportunity to act as its architect. Shortly after his disappointing rejection as a practitioner, the pope granted Fontana unprecedented control over the project's planning and execution. Fontana assumed the two primary roles needed to move the obelisk—*inventore* and *conduttore*. The *congregazione* assumed Fontana too young for the delicate task of transporting the *guglia*. They complained that he had not even passed his forty-second birthday.[215] They deemed Ammannati more worthy of the task because of his age, 65 years old at the time, and greater experience in the art of moving weights. Fontana, though trained as a *stuccatore*, was still considered reasonably young in a period in which few specialized as architects or came to

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[214] *ASR*, *Congregatio super viis, pontibus et fontibus*, *Reg. 1 157v-158r.* The document is also reproduced in the original Latin in D'Onofrio (1992) and in Bertolotti.

[215] Fontana, fol. 5v.

practice later in their careers. Fontana gave the outward appearance of satisfaction on this decision:

> Indeed, I was greatly pleased in this at least, that among so many fine and diverse wits, designs, and models, my invention took first place, and was chosen and approved as the best, and assigned to two qualified architects to be used to such an effect. Moreover, I remained free from any worry that might have prevented me from completing a task, so important, difficult, and full of risks and dangers, one never attempted by anyone in our age.[216]

Fontana was not the first architect to be put in this awkward position. In a well-known anecdote about the relationship between the designer and project supervisor in the sixteenth century, Vasari recounts a famous example in *Lives of the Artists* of the competition for the cornice of the Farnese Palace. Antonio da Sangallo the Younger loses the commission to Michelangelo, but the performance of the work was deemed to be outside Michelangelo's field or technical experience. Humiliated by his defeat, Sangallo is 'forced' to be the project coordinator. This outcome upset poor Sangallo so deeply that he died from the shame.[217]

Although the shortlist for the obelisk project included Ammannati, not much else is known about his proposal or how he was first named its architect. Cesare D'Onofrio reviews the archival evidence of Ammannati's contribution. Private documents indicate the architect's intention to move the obelisk upright, and that he presented his ideas orally, without any models or drawings. A letter, written by the Mantuan ambassador to Rome, Camillo Capilupi, suggested

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[216] Fontana, fol. 5v; Sullivan, trans., 11. The passage reads in the original Italian as follows: "*e con mio gran contento per certo in questa parte almeno, che frat anti belli ingegni, disegni, e modelli diversi, l'invention mia fusse posta inanzi, scelta, & approvata per la migliore, & assegnata a due valuenti Architetti per esser adoprata a tanto effetto, e restai libero da ogni pensiero, che mi potesse arecare il menare à fine opera così importante, e difficile, e piena di rischi, e pericoli non tentata ancora da nissuono all'età nostra*."

[217] For a fuller account of the Renaissance views on project coordination see James S. Ackerman, "Architectural Practice in the Italian Renaissance", in *JSAH* 13:3 (October 1954): 3-11.

that three committee members, including Cardinal Sforza, Signor Sanguigna and Prior Giustiniano, had already negotiated Ammannati's appointment.[218] Giacomo della Porta, appointed as Ammannati's assistant, placed a wooden stake in the obelisk's new location in front of the basilica, several days before the second meeting of the congregation.[219] According to Baron Hübner in the *Life and Times of Sixtus V*,

> Rome was loud in its condemnation, and thought that the enterprise would not succeed. The celebrated Bartolomeo Ammannati, who had asked the Pope to allow him a year's reflection before he submitted his plan to him, returned to Florence, there to die of grief when he heard of his obscure rival's success.[220]

In choosing Fontana's model, the cardinals likely compromised in an effort to satisfy the pope and overcome their own doubts about the inventor's inexperience.

"The Power To Do, Command, Execute, and Practice"

After having "held off for seven days without going or allowing [himself] to be seen", Fontana met with Sixtus V to discuss his desire to command the project. During this conversation, which took place at the private papal residence at Monte Cavallo, Sixtus asked Fontana to speak candidly on the state of the obelisk project. Domenico recounts:

> I replied that I thought that it was in very good hands, but since I very much wanted the undertaking to succeed, I was afraid, if perchance during its execution by others, something untoward should occur, that people might think there was a defect in my model. I had fallen into grave misgivings, and it seemed that in this respect would be done a certain injustice, given that I thought that no one could execute another's invention

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[218] D'Onofrio*, De gli obelischi di Roma* (1992), 152.

[219] Giacomo Della Porta was compensated for this action. See Orbaan, "La Roma di Sisto V negli *Avvisi*" in *Archivio della R. Società di Storia Patria*, vol. 23 (Rome: Biblioteca Vallicelliana, 1910).

[220] Hübner, *The Life and Times of Sixtus the Fifth*, vol. 2, (1872), 122-3.

> as well as the inventor himself, since no one can every fully understand the intention or thought of another.[221]

Even in the hands of experienced architects like Ammannati and della Porta, Fontana worried about the project's failure and the responsibility being laid on him. The pope agreed that Fontana should lead the project, allowing him as the *inventore* to put his plan in motion, and "ordered that [he] should be the principal mover of the task, and execute his own ideas."[222] On this day, September 25, 1585, Fontana finally basked in his victory. He describes it as "a truly notable day, and fortunate in the course of the life, deeds, and greatness of Our Lord."[223] The date coincided with the anniversary of Sixtus V's episcopate, his first important ecclesiastical office on the road to the papacy. Now embarking on the first of many "high memorable events," the paths for patron and architect aligned.

Excavations for the new foundations of the *guglia* began immediately with Fontana's investiture of power. Sixtus "at once [...] had sent [Fontana] with fifty men to dig a ditch where [they] needed to lay the foundation on the piazza of St. Peter's opposite the principal doorway, the same place where a beam had been planted by Ammanati and messer Giacop della Porta."[224] As they progressed, Fontana and his workers examined the soil conditions in the trench and discussed how the earth should be reinforced for the new foundations. He venerated the sacred occasion by throwing two travertine caskets each containing twelve commemorative medallions

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[221] Fontana, fol. 5v; Sullivan, trans., 11. The original passage reads as follows: *[...] risposi di giudicarne bene salvo, she sendo io molto desieroso, che l'impresa riuscisse a buon porto, e dubitano, che (se per aventura, nell'esequire, ch'altri havesse fatto la mia inventione, fusse interevento qualche sinistro) si credesse alcunno, che ciò fusse avenuto per difetto del mio modello; io era caduto in gran pensiero, e parevami per questo rispetto patire un poco di torto: atteso ch'io giudicava, ch'alcuno non potesse mai eseguire così bene l'inventione altrui, quanto l'inventore istesso: sendo che non si trova huomo, che possa a pieno intender mai l'intentione, o pensiero dell'altro huomo.*"

[222] Fontana, fol. 5v; Sullivan, trans., 11.

[223] Ibid.

[224] Ibid.

into the pit. In his description of the event, Fontana carefully describes the medallions and their symbolic imagery as memorials of Sixtus V's first great acts as pope.

As the foundations were dug, Fontana needed to procure the necessary materials to build the *castello* in preparation for the great transportation, but in order to proceed; he required even further authority than typical of a *conduttore*.[225] Sixtus assented to Fontana desires and granted him powers exceeding even those of the *Fabbrica di San Pietro.* The authority given was absolutely unique; Fontana proudly records it by including the original text — the *Sustantia del Privilegio*—within his own book. The explicit rationale was pragmatic and primarily a means to "facilitate the business, and to speed matters more solicitously".[226] But the papal bull ruthlessly overpowered the committee's decision to name Ammannati and Giacomo della Porta as the supervisors of the endeavour. The *Sustantia del Privilegio* placed Fontana in a position to act, to order his environment, and to exert his judgment without opposition.

The *privilegio* granted him, by decree of the pope: "to avail himself so long as this transport lasts, of however many workers, laborers, and their things, if they wish, and to compel them if necessary, to lend or sell them to him, satisfying them with due recompense."[227] For the duration of the project, Fontana exercised absolute control over all aspects of his project and anything that would prove an obstacle to his work on the *guglia.* He gained access to any timber or other materials already belonging to the basilica or canons of St. Peter's, the city of Rome, the Campomarto estate, the hospital of San Spirito in Sassia and the Apostolic Camera, without need

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[225] The English translation refers to the *castello* as a 'scaffold'. This term does not adequately encompass its usage or its cosmological meanings. See Eric Solomon Toker "An Architectural Excursus into the Site of Becoming: Domenico Fontana's *Della trasportatione dell'obelisco Vaticano.*" Master's thesis, McGill University, 1998.

[226] Fontana, "Copia della Sustantia del Privilegio", fols. 6r-6v; Sullivan, trans., 12-4.

[227] Fontana, fol. 6r; Sullivan, trans., 12.

of compensation. For timber and other resources not belonging to the above organizations, he need only pay the "due price to the owners."[228] According to the decree, Fontana was allowed to "buy and take away the above-mentioned things and anything else needed from any person whatsoever without paying excise taxes or duties of any kind".[229] Fontana, therefore, executed his work with impunity whether it required seizure of materials, animals, or space.[230] Along with his agents, he was also permitted to take whatever means necessary:

> In sum, the said Domenico Fontana is given the power to do, command, execute, and practice all other things necessary to this end; and moreover, along with his agents, servants, and domestic servants, he may bear any sort of arms (except those that are prohibited) in any place and at any time.[231]

The threat of penalty for not abiding by these rules, was 500 ducats payable to the Camera, so that no one dare "impede or in any way hinder the aforesaid task of this Domenico or his agents or workers; and that they aid, obey, favor, and assist him, without delay or any manner of excuse, notwithstanding any other commands whatsoever."[232] With this edict, Fontana became the *conduttore* above and beyond his role as inventor of his machine.

The transfer of power did not come without its disadvantages. In his classic study of the Egyptian obelisks of Rome, Eric Iversen describes the damage of these events to Fontana's public reputation. He contends that:

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[228] Ibid.

[229] Fontana, fol. 6r; Sullivan, trans., 13.

[230] The Substance of Privilege decreed that Fontana could exercise is authority irrefutably, even if this meant demolishing buildings or disrupting the lives of Roman citizens.

[231] Fontana, fol. 6v; Sullivan, trans., 13. The passage reads as follows: "*In somma si da faculta a detto Domenico Fontana, di fare, comandare, essequiare, & essercitare ogn'altra cosa necessaria a questo effetto, e di più, ch'insieme con i suoi agenti, servitori, e persone domestiche in ogni luogo, e d'ogni tempo possa portare ogni forte d'Arme eccetto le prohibite …*"

[232] Fontana, fol. 6v, Sullivan, trans. 13-4..

> the high-handed, and certainly rather ruthless, encroachment on the authority of the committee was at the time considered an injustice as well as an affront, and Fontana for a while the target of a full scale attack from the well-organized army of Roman scandalmongers, lampooners, and professional calumniators. These he very wisely seems to have disregarded, flinging himself into work with almost superhuman determination and perseverance.[233]

Distrust of his intentions and the manner in which he "won" the competition would persist. Even after the death of Sixtus, this controversy lead to scrutiny over Fontana's financial dealings and ultimately was the basis of his exile from Rome.

THE MECHANICS OF MOVING THE OBELISK

Mechanical works involved wonder and spectacle, but they could also perform great deeds in wars, military fortifications, or building cities; and the problem of the obelisk continued to be a subject of discourse among intellectuals and practitioners after Fontana's victory in 1585. Seminal authors on the status of machines, Guidobaldo del Monte and Filippo Pigafetta (1532-1604), thought mechanical knowledge combined natural philosophy, mathematics and astrology, with the activities of crafting and building.[234] Guidobaldo and Pigafetta direct their discussion of mechanics to the noble class and emphasize its "use" to suggest how state leaders can exert power and control. The emphasis in Pigafetta and Guidobaldo's writings on 'operating' power, and their tendency to distinguish the art of mechanics from its practical 'applications', can be read as the seed of an instrumentalist understanding of technology. For Pigafetta however, a

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[233] Eric Iversen, *The Obelisks of Rome*, vol. 1 of *Obelisks in Exile* (Copenhagen: Gad, 1968), 30.

[234] This passage is excerpted from Pigafetta's dedicatory letter to Savorgnano in *Le mechaniche*, translated by Stillman Drake in *Mechanics in Sixteenth-Century Italy: Selections from Tartaglia, Benedetti, Guido Ubaldo and Galileo*, eds. Stillman Drake and I.E. Drabkin (Madison: University of Wisconsin, 1969), 248.

maker of machines built "celestial spheres showing the various heavens and the movements of the planets and other heavenly bodies like a miniature universe [. . .]".[235] These texts on mechanics reflect an uneasy image of the practitioner in the 1580s that can potentially explain the transformative aspects of the *conduttore* with respect to the culture of machines.

About a month before the raising began, Filippo Pigafetta, a Vicentine diplomat, humanist and soldier, published *Discorso di M. Filippo Pigafetta; d'intorno all'historia della aguglia, et alla ragione del muoverla* (fig. 3.5).[236] Guidobaldo del Monte's Latin treatise, *Mechanicorum Liber* (1577), and Filippo Pigafetta's Italian translation *Le mechaniche* (1581) advocated a new view of mechanics as an intellectual pursuit to be liberated from the instrumentalization of manual labour.[237] Rumours still circulated about Fontana's legitimacy to lead the *guglia* and whether there might be a better candidate. The *Discorso* justified Sixtus V's motivations by presenting the obelisk's ancient history and symbolic origins.[238] It also detailed the method for transportation, without actually crediting Fontana for its conception, at least not

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[235] Ibid, 249.

[236] This work was published by Bartolommeo Grassi, the same publisher for Fontana's *Della trasportatione*. Grassi also published the commemorative engravings of the event by Natale Bonifacio and Giovanni Guerra. The prints and the texts on moving the obelisk were published *con privilegio*, meaning that Pope Sixtus V officially sanctioned them. See Christopher Witcombe, *Prints and Privilegio in Sixteenth-Century Venice and Rome* on the publications associated with the Vatican obelisk project and a discussion of the use of publishing license (Leiden: Brill, 2004).

[237] For more on the debate around the mechanical arts as "vile" see Paolo Rossi, *The Birth of Modern Science*, trans. Cynthia De Nardi Ipsen (Oxford, UK: Blackwell, 2001), 15-17. Rossi notes *Guidobaldo's Mechanicorum Liber* (1577) and Agricola's *De re metallica* (1556) for how they "extolled the virtues of the active life" (16). Other seminal discussions of the status of the mechanical arts in this period include Maria Luisa Biagi, "Vile meccanico," *Lingua Nostra*, 1965, 26: 1-12; Roy Laird, "The Scope of Renaissance Mechanics," *Osiris* 2 (1986) and M. Henniger-Voss, "Working Machines and Noble Mechanics: Guidobaldo del Monte and the Translation of Knowledge," *Isis* 91, no. 2 (June 2000): 233-59.

[238] Pigafetta became a trusted agent of Sixtus V's administration. He also served as a military advisor to Ferdinando de' Medici, the Grand Duke of Tuscany, one of the cardinals who served on the *congregazione*.

until the final page. Only at the end of the treatise does Pigafetta vouch for Fontana's qualifications and name him the *conduttore* of the work.

Before writing his seminal text on the obelisk project, Pigafetta debated technical problems with the Venetian military engineer and nobleman Giulio Savorgnano. The diplomat first arrived in Rome in October 1585, during the preparation of the *guglia*'s foundations and just after the issue of the *Sustantia del Privilegio*. His correspondence with Savorgnano chronicled every aspect of his European journey (to accompany the Venetian ambassador on a diplomatic envoy).[239] The letter, in closing, commented on his involvement with the obelisk project:

> Here we wait to place the foundations for putting it in the obelisk, and take it from there, and already some of the houses are torn down, we shall see, and I am taking great pleasure in finding myself in this project, which is not the invention of the person that created the book, but that of somebody else. I will give an account of what will happen in another letter, for the time being too tedious.[240]

In this brief account, Pigafetta alluded to his desire to act on the project, and informed Savorgnano that Camillo Agrippa's model was not chosen; instead the project was awarded to another architect.[241]

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[239] Pigafetta first met Sixtus V in October of 1585, when he accompanied the Venetian ambassador, Marc Antonio Barbaro to Rome. Pigafetta writes about this in a letter written to Giulio Savorgnano, attributed to him (based on the dates he mentions in this letter). The letter was published in 1854 for the wedding of the Contessa Marina Tiepolo. See Filippo Pigafetta, *Descrizione della comitiva e pompa con cui andò e fu ricevuta l'ambasieria dei Veneziani al pontefice Sisto V*, (Padua: Tipi di Sica, 1854).

[240] My translation. Pigafetta, (1854), 22. The passage in the letter reads as follows: "*Qui si attende a piantare le fondamenta per mettervi la guglia, et levarla di là, et di già si sono gittate a terra alcune case; staremo a vedere, et ho gran gusto di trovarmi a questa fattura, che non è invenzione di quello che ha stampato il libro, ma di un altro.*"

[241] Carugo suggests that this has to be Agrippa, which is likely true since he is the only one to have published a work on the project at this time. Carugo describes these letters at length, and reproduces one of them in the facsimile edition of *Della Trasportatione* (1978).

Pigafetta's interest in the mechanical arts surfaced years earlier during a visit to Count Giulio Savorgnano's at Osoppo in 1580. A designer of war machines, the count introduced Pigafetta to his collection of mechanical devices and objects of wonder, all demonstrations of the mastery of the human intellect over nature:

> I was delighted to see your warehouse of arms neatly arranged, a magazine of warlike machines and machines to move weights, of which you have through your industry fabricated perhaps a dozen different sorts, some to drag weights, some to raise great weights with little force. One has but a single toothed wheel, yet it draws up steeply five of your cannons by the strength of Gradasso, your dwarf.[242]

"Having seen and tested"[243] Savorgnano's machines, awakened Pigafetta's fascination with the mechanical arts. As a result of this visit, Savorgnano urged him to translate Guidobaldo del Monte's *Mechanicorum Liber* (1577) into the vulgar tongue, and Pigafetta responded with a proposal to make Guidobaldo's ground-breaking work accessible to a larger audience, including those '*mechaniche*' who were illiterate in Latin. In 1581, he published the results, a translation and commentary entitled *Le mechaniche*.

The Myth of Archimedes

Plutarch's *Life of Marcellus*, describes the Syracusan engineer Archimedes, as the man who could "move any given weight."[244] King Hiero of Sicily wanted proof of Archimedes'

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[242] Pigafetta translated by Stillman Drake in *Mechanics in Sixteenth-Century Italy: Selections from Tartaglia, Benedetti, Guido Ubaldo and Galileo*. eds. Stilllman Drake & I.E Drabkin (Madison: University of Wisconsin, 1969), 253-4.

[243] Ibid.

[244] Plutarch, *Lives,* Marcellus, XIV, 6-9, trans. by Bernadotte Perrin, Loeb Classical Library 87 (Cambridge MA: Harvard University Press, 1917), 473.

powers and so asked him "to put his proposition into execution, and show him some great weight moved by a slight force."[245] In order to demonstrate his skill Archimedes,

> fixed upon a three-masted merchantman of the royal fleet, which had been dragged ashore by the great labours of many men, and after putting on board many passengers and the customary freight, he seated himself at a distance from her, and without any great effort, but quietly setting in motion with his hand a system of compound pulleys, drew her towards him smoothly and evenly, as though she were gliding through the water. Amazed at this, then, and comprehending the power of his art, the king persuaded Archimedes to prepare for him offensive and defensive engines to be used in every kind of siege warfare.[246]

Single-handedly, and with total ease, Archimedes persuaded the king entrust him with designing the engines and machines for the war against the Romans. Plutarch describes how Archimedes then commanded the assault,

> For in reality all the rest of the Syracusans were but a body for the designs of Archimedes, and his one soul moving and managing everything; for all other weapons lay idle, and his alone were then employed by the city both in offence and defence.[247]

In the ancient myth, Archimedes fabricated the machine, but the act of moving was the metaphor for power and control.

Although Guidobaldo's remarks are predominantly the foundations for Pigafetta's commentary, there are a few notable distinctions. His preface for the *Mechanicorum Liber*, which outlined his view on mechanics, did not appear in Pigafetta's translation.[248] Guidobaldo's introductory text largely commented on the status of mechanics and its relationship to other

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[245] Ibid.
[246] Ibid.
[247] Plutarch, 479.
[248] There is a reason for the omission of Guidobaldo's preface. Although he consulted with Pigafetta via a series of letters, he did not want this to be an official translation of his text. He did not commission the translation.

forms of knowledge such as mathematics. Both authors however, were concerned with elevating the status of mechanics, particularly in the view of the educated ruling class.

Guidobaldo published his treatise during the reign of Pope Pius V, and dedicated it to the Duke of Urbino, Francesco Maria II. Guidobaldo proposed a revised understanding of mechanics as a "noble" and "admirable" form of knowledge. Del Monte was of noble birth, bearing the title *marchese* of Montebaroccio, and educated at the University of Padua. He argued mechanics originated in geometry and natural philosophy, but he also asserted that mechanics allows the exertion of power into the physical world. The potential benefit of acquiring mechanical knowledge was related to its two essential qualities: "utility and nobility."[249]

In *Le mechaniche*, Pigafetta defines mechanics as being the merging of theory and practice. He believes it to be a form of knowledge that involves reasoning and working with one's hands.[250] Mechanics involves the study of philosophy, where "we assign the cause of […] natural movements," and the invention of machines, where "we force bodies to leave their natural places, carrying them upward and in every direction, contrary to their nature."[251] Through an education in this dual nature, one becomes a "skilled mechanic, inventor, and maker of marvelous works."[252] As a science of the "highest theoretical value" it was also useful to rulers as an aid to the "most important actions in our lives."[253] According to Pigafetta, these more noble applications are found in the fields of war, medicine, agriculture, commerce and entertainment.

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[249] Guidobaldo, 241.

[250] Pigafetta, 248. In “The Scope of Renaissance Mechanics”, W. R. Laird identifies three branches of mechanics in the medieval tradition including natural philosophy, machine-building, and the lifting of heavy weights and how the humanists synthesized these separate traditions during the sixteenth century, further consolidating the field of mechanics.

[251] Pigafetta, 248.

[252] Ibid.

[253] Ibid.

More than Pigafetta, Guidobaldo challenged the relationship between mechanics and theoretical knowledge, but he clarified that “mechanics can no longer be called mechanics when it is abstracted and separated from machines."[254] Pigafetta more overtly promoted the practical aspect of mechanics by concentrating on the military application of machines as a benefit to society. These respective focuses illustrate the tension between the exalted form of mathematics, and the manual activity of machines that underlay sixteenth-century mechanical culture.

For both authorities, Archimedes stood out as "the best of all craftsmen up to his time"[255] and elevated mechanics from its degenerate associations. Pigafetta retold the familiar story narrated by Plutarch of Archimedes repelling the Roman armies via a miraculous iron claw that lifted ships into the air before dropping them back into the sea. He outsmarted the enemy through the manipulation of devices, even convincing the powerful emperor Marcellus that only siege warfare could be used to defeat the Syracusans, since all of their offensive attacks had been easily foiled by Archimedes’ ingenious mechanics. Since the Italian translation of Plutarch's *Lives* of Marcellus had been printed in the fifteenth century, there had been an increasing circulation of Archimedes' exploits as a great thinker and designer of fantastical machines.

Guidobaldo also revered Archimedes, emphasizing that the legendary figure should be regarded as a mathematician above all and therefore as a model for imitation.[256] Sharing the humanist vision of Archimedes, Guidobaldo represents him as having the divine power to demonstrate the mysteries of the universe. He recalls another story about how the mathematician crafted a glass model of the cosmos:

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[254] Guidobaldo, 245.
[255] Pigafetta, 250.
[256] Guidobaldo, 243.

> [Archimedes] made a model of the universe all enclosed in a quite small and fragile glass sphere, with stars that imitated the actual work of nature and so accurately exhibited the laws of the heavens by their precise motions that the hand that rivaled nature deserved the following encomium: 'So does his hand imitate nature that nature herself is thought to have imitated his hand."[257]

The machine in this story is a mimetic device for celestial motion, but it is also a reflection of its creator. Archimedes does not simply build—he performs the movement of his perfectly crafted model.

Similarly, Fontana's true mastery comes from his combined efforts as inventor and conductor. Like the Archimedean archetype, he puts his theory into motion by not simply making but enacting and animating his device. Although his literal authority rested on the bull given to him by Sixtus V, Fontana's true power was vested in his capacity as the *artificio*, the architect of the *guglia*. It is only within the sixteenth-century context of the architect as inventor, conductor and genius behind the performance of the planned work that Fontana's movement of the obelisk can be seen in its entirety and not simply as a feat of engineering.

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[257] Ibid.

DISCORSO
DI M. FILIPPO
PIGAFETTA;
D'INTORNO ALL'HISTORIA
DELLA AGVGLIA, ET ALLA
ragione del muouerla.

CON PRIVILEGIO.

IN ROMA,
Appresso Bartolomeo Grassi. M D LXXXVI.
CON LICENTIA DE' SVPERIORI.

Figure 3.5 Title page for Filippo Pigafetta, *Discorso di M. Filippo Pigafetta d'intorno all'historia dell aguglia et alla ragione del muoverla* (Rome: Bartolomeo Grassi, 1586).

CHAPTER 4

THE METAPHYSICS OF MOVEMENT

From April to September 1586, Domenico Fontana led the Vatican obelisk to the piazza of St. Peter's. As *conduttore*, he executed an interrelated series of operations in order to transport and consecrate the Egyptian obelisk, including unearthing, raising, lowering, dragging, erecting, aligning and exorcising. A benediction ceremony dedicated to the cross thus culminated the transportation and resulted in the pagan stone's conversion. Fontana's plan envisioned the process as a series of three 'motions' (*moti*): lowering, dragging and re-erecting.[258] He tacitly defined the cosmological and mimetic nature of these processes in his text. 'Transportation' as a concept therefore represents the metaphysical aspects of the obelisk's journey.

The illustrations of the Vatican obelisk in *Della trasportatione* are based on the original commemorative prints of the event (1586) (see figs. 4.1 and 4.2). In their representation of motion, they exploit a body of visual conventions established in cartography, chorography,

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[258] Fontana, fol. 5r; Sullivan, trans., 10. Fontana writes, "*la maggior parte d'essi concorrevano in questo di trasportare la Guglia in piedi giudicando cosa difficilissima il distenderla per terra, & la tornarla di novo à dirizzare spaventati credo dalla grandezza, e peso della machine credendosi forse esser maggiore facilità, e sicurezza il condurla la diritta nel movimento mezano, che ne gli altri tre moti di abbassarla, trascinarla, e rialzarla*." Here Fontana argues that while many of his competitiors were daunted by the obelisk's size and weight when determining the method of its transport, he alone understood that the obelisk should not be moved upright, but rather according to a process of three movements.

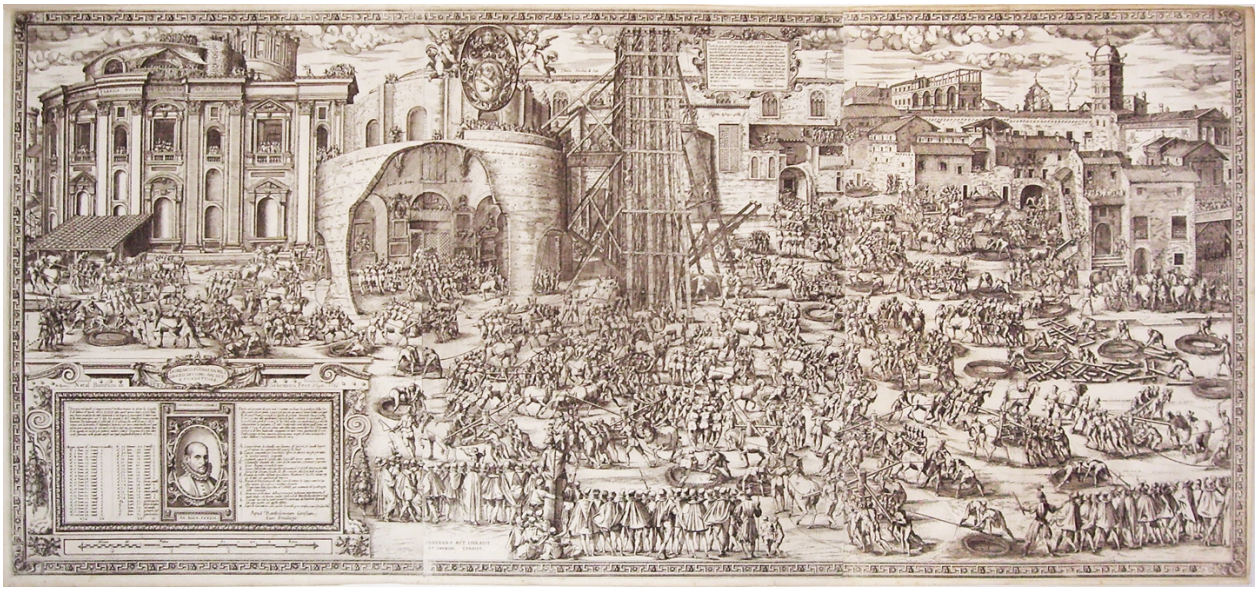

Figure 4.1 Natale Bonifacio after drawings by Giovanni Guerra. *The Raising of the Vatican Obelisk*. 1586. Collection of the CCA, Montreal.

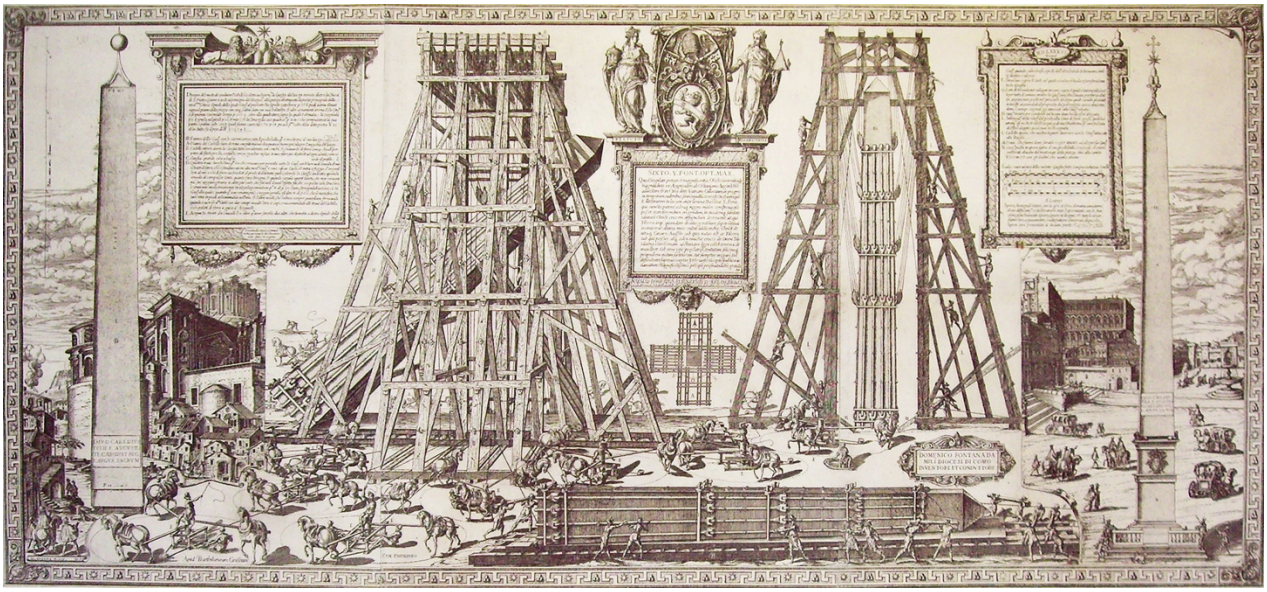

Figure 4.2 Natale Bonifacio after drawings by Giovanni Guerra. *The Stages of Moving the Vatican Obelisk*. 1586. Collection of the CCA, Montreal.

military strategy, architectural drawing, machine, and fête books (forms of literature that were undergoing significant innovations in the 1570s and 1580s).[259] However, these images were also unique, given that Fontana claimed a lack of precedent for the documentation and notation of the massive coordination effort.

This chapter explores the site preparation, mobilization, translocation and the re-erection of the obelisk under Fontana's direction. The cosmological nature of the project is expressed through the principles of firmness, stability, concordance, and harmony and through the translocation, alignment and consecration of the obelisk. During the first phase, preparations for the obelisk's lowering included building the *castello*, and choreographing the machinery's movement. "Firmness" and "concordance" as principles of time, the perfect cosmos, and the model for the machine's movement become the means for the architect's embodiment of the *conduttore*.

'*FIRMITAS*' AND THE CONSTRUCTION OF THE '*CASTELLO*'

In the design of the machine, Fontana conceived a tower as a stage from which to harness and lower the suspended obelisk, to operate the pulleys, and to oversee the movement of the winches. He writes,

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[259] For example, see Thomas Frangenberg, "Chorographies of Florence. The Use of City Views and City Plans in the Sixteenth Century," *Imago Mundi*, 46 (1994): 41-64; and Michael Bury, "The Meaning of Roman Maps: Etienne Dupérac and Antonio Tempesta," in *Seeing from Above: The Aerial View in Visual Culture*, Mark Dorrian and Frédéric Pousin, eds. (London: I.B. Tauris, 2013), 26-45.

> this *castello*, being made and strengthened in such a fashion was of such and so great strength that if any great building were placed upon it, it would not have yielded, just as if there had been a solid mass of great stones or a wall of masonry built there.[260]

A perspectival drawing of the *castello*'s southern face demonstrates the required iron pins, hoops and bindings (fig.4.3).[261] Fontana's description specifies the arrangement of connections and hoisting tackle to ensure proper reinforcement and that the main members splay outwards with the increased height and the obelisk's added weight. In accordance with the Vitruvian concept of *firmitas*, the framework employed eight masts (*antennae*) forming a symmetrical, tapered structure that framed the obelisk.[262] Each mast, soaring to approximately twenty-eight metres in height (exceeding the obelisk's summit by two metres), consisted of four timbers (*travi*) joined with iron pins (*chiodi*). From below, forty-eight wooden buttresses complete the framework, in concordance with *firmitas* and the image of a stable universe.

Despite Fontana's insistence on its strength and solidity, the *castello* was also designed so that it could be 'made' or 'unmade' through rapid disassembly and re-construction.[263] In contrast to Camillo Agrippa's transportable scaffold, which resembled a military assault machine, Fontana's *castello* was dismantled after it successfully deposited the obelisk in a prone position on to a sledge (*strascino*). This sledge would transport the obelisk along a dedicated causeway

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[260] Fontana, fol. 11r; Sullivan, trans., 20.

[261] In *Della trasportatione*, fol. 12r shows the side elevation of the *castello* with the lever in operation and the adjacent wall of the sacristy. The allegorical figure is holding a pyramid inscribed with *firmitas*. The pyramid form alludes both to the shape of the obelisk and the pyramidal construction of the *castello*.

[262] This description is included in the section "Description of the Form of the *Castello* Made to Raise the *Guglia*." See Fontana, fols. 10v-11r; Sullivan, trans., 19-21.

[263] "*e questo per poter piu presto fare, e disfare detto Castello senza guastar nissun trave*". Fontana, fol. 10v.

Figure 4.3 Perspective of the *castello* with *Firmitas*. *Della Trasportatione dell'Obelisco Vaticano*, fol. 12r. Digital facsimile from the copy in the Library of Congress. Oakland, Octavo, 2002.

(*argine*) into the cavity of the *castello*, reconstituted in the piazza of St. Peter's.[264] The making and unmaking was an integral part of the practice of the monolith's translocation. In the sixteenth century the term *castello* referred to a scaffold construction, tower, or 'engine of war'.[265] The terminology applies to temporary structures used in civic pageantry, pyrotechnic displays and building construction. The *castello* as conceived by Domenico Fontana, embodied the ephemerality of the event.

An often cited precedent for the depictions of the *castello* is Agricola's cutaway drawings of subterranean scaffolds in *De re metallica.*[266] In these images (as seen for example in fig.4.4), the earth is exposed to reveal the supporting framework for a water pump. Of Fontana's twelve representations of the Vatican obelisk in transit, the scaffold is depicted in all but two.[267] Over the course of the sequence of movement, the *castello* is transformed from model/concept (carried aloft by a pair of angels, evoking the imagery of the Loretan shrine, to elevations that convey the

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[264] Lynne Lancaster uses Fontana's drawings to posit an argument for how ancient builders lifted the stone blocks for the construction of monuments, in "Building Trajan's Column," *American Journal of Archaeology* 103, no. 3 (July 1999): 419-39.

[265] The scaffold construction is referred to as a *castello* in most of the literature, including Pigafetta in the *Discorso* (1586), Mercati in *De gli obelischi di Roma* (1589) and Ferrucci in *L'antichità di Roma* (1588). Ferrucci also described it as a *mole*, which has the same military usage. Athanasius Kircher in *Oedipus Aegyptiacus* (1654) and Carlo Fontana *Tempio Vaticano* (1694) maintain the term *castello* to refer to the staging platform of the machine. For the development of machines in the context of theatrical stage machinery see Edward Carrick, "Theatre Machines in Italy, 1400-1800," *Architectural Review* 80 (1931): 8-14.

[266] Georgius Agricola, *De Re Metallica*, trans. Herbert Clark Hoover and Lou Henry Hoover (New York: Dover, 1950), 185.

[267] The exceptions being the last image in the series, which shows the obelisk's final state, and one drawing that features the obelisk as it moved laterally on the causeway towards the newly raised *castello.* Of the twelve drawings showing the obelisk in transit, three are predominantly plan views, two elevations, and the remainder are perspectival views of the scaffold and the obelisk in different positions and orientation.

symmetry of its construction (see the sequence of movement in fig. 4.5).[268] The personification of *Firmitas* (*Fermezza*) by Giovanni Guerra, holding a compass and pyramid, appears in an illustration of the *castello* and its assembly. She and *Concordia* are the only two allegorical figures in the treatise who are explicitly named, unlike *Sicurtà* and *Gratia* who are identified by virtue of their attributes.[269]

Ripa's *Iconologia* depicts *Fermezza* in a robe patterned with a constellation of stars. According to Ripa, her attributes are to represent:

> Firmness as that of the sky, which for its perfection, according to the whole is not subject to local mutation, nor corruption, and can not waver in any way.[270]

For the Vatican obelisk project, the *castello* is an emblematic architecture. Throughout the literature recounting the event, it became the iconic form for Fontana's method. The antiquarian Girolamo Ferrucci republished Andrea Fulvio's 1527 guidebook to Rome, *L'antichità di Roma* (1588). The update appeared during the flurry of activity associated with the Sixtine obelisk campaign, offering a timely account of the Vaticanus and a woodcut of the *castello* (fig. 4.6). *L'antichità di Roma* provides details of the *castello*'s construction—the spacing of the supporting members, the joints and the ligature—and insight on the "art of Architecture".[271] The

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[268] The perspectival views include fol. 12r, fol. 18r and fol. 20r, in *Della trasportatione* (1590).

[269] For a discussion of the allegories and Guerra's contribution to Ripa's *Iconologia* see Stefano Pierguidi, "Giovanni Guerra and the Illustrations to Ripa's *Iconologia*," *Journal of the Warburg and Cortauld Institutes* 61 (1998): 158-75.

[270] My translation. "*Mostrano Fermezza, per similitudine della Fermezza del cielo, il quale per la sua perfettione, secondo il tutto, non è soggetto e mutatione locale, ne corrottiva, & non può in modo alcuno vacillare in alcuna parte*." Cesare Ripa, "Fermezza" in *Iconologia*, 234.

[271] Andrea Fulvio, *L'antichità di Roma* (Venice, 1588), 316-317. The full caption of the *castello*'s illustration reads *"La forma della mole, overo machina di legno, che si chiamò il Castello, con il quale fu rimosso, abassato & alzato l'Obelisco Vaticano, & poi vi furono alzati quelli del Cerchio Massimo, & del Mausoleo d'Augusto nell'Esquilie, & nel Monte Celio."*

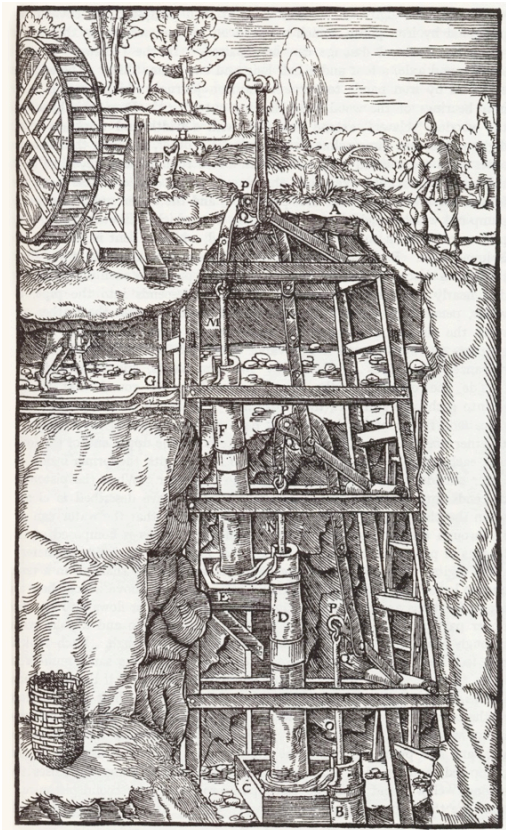

Figure 4.4 A *castello* from Agricola, Georgius. *De Re Metallica*. Translated by Herber Clark Hoover and Lou Henry Hoover. New York: Dover, 1950, p.185.

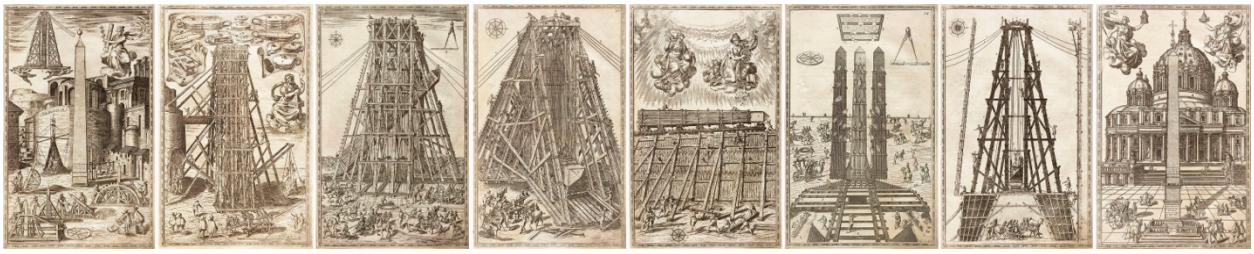

Figure 4.5 Sequence of movement of the obelisk in *Della trasportatione* (fols. 8r, 12r,18r, 20r, 24r. 28r, 30r, 35r). *Della Trasportatione dell'Obelisco Vaticano*. Digital facsimile from the copy in the Library of Congress. Oakland: Octavo, 2002.

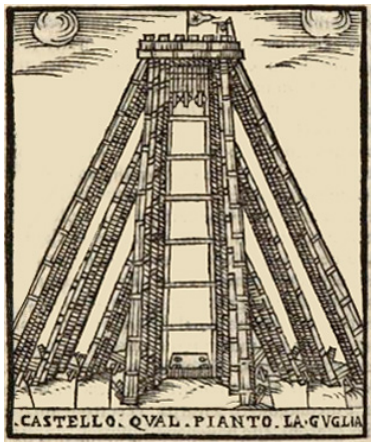

Figure 4.6 The castello from Fulvio, Andrea. L'antichità di Roma di Andrea Fulvio Antiquario Romano, Di nuovo con ogni diligenza corretta & ampliata, con gli adornamenti di disegni de gli edificij Antichi & Moderni (…). Venice: Per Girolamo Francini Libraro, 1588.

castello's dual nature—permanent/transient, fixed/movable—echoes its transformative aspects. It serves all of the necessary functions of lifting the obelisk, while representing different images of architecture (altar, command tower, temple, machine).

The role of the *castello* is redefined in Fontana's discourse as the obelisk's movement unfolds. After lifting the obelisk from its old pedestal, it had to be lowered onto the sledge. Fontana described this process as the most harrowing and dangerous as there was a persistent fear that it would collapse. In the passage that follows, the stability of the *castello* opposes the obelisk's tempered motion. Strapping prevented the heavy stone from lowering too quickly as its nose moved downwards. The description of this movement is centered on the *castello* as the stable framework for the obelisk's changing state:

> When the point of the needle had to turn toward the earth, it was supported from behind by two joists that were fixed to the last columns of the *castello*. And while the foot was being pulled, the point, unable to overpower the buttresses, was tilted to the earth with greatest ease. To avoid any risk of collapse in the lowering process, five blocks, which corresponded to five others attached to the point of the needle, were rigged and fixed beneath the vault of the sacristy; the blocks acted as a sort of bridle, moderating the descent in such a way as to produce no shock. When it was in the midst of its descent, since its weight passed largely above the foot, it began to slide of its own accord inward upon the rollers, and it was no longer necessary to pull it. Rather, it was necessary to brake this motion, which was too vigorous, by rigging a block and attaching it to the foot

of the needle, and thus to govern it according to the pleasure of the *conduttore*.[272]

This process is shown in the image of the *castello* epitomizing permanence and stability, with the form of the obelisk turning downwards, in a controlled, paced movement as the obelisk descends (fig. 4.7). The *castello* is outfitted with stairs for workers to move up and down the height of the framework. A figure mounted on the pyramidion's tip leads the descent with his arm outstretched. Perspectival views show the transformation of the machine and *castello* as part of the process of movement. In the first, the *castello* is built around the obelisk, joined via a bridge to the sacristy building, and equipped with five levers to enable the lifting. As the process unfolds in time, the obelisk is lowered to its prone position so that it can be prepared to travel.

CONCORDIA AND THE MACHINE'S HARMONIOUS MOVEMENT

An expression of Pythagorean and Neoplatonic philosophy, the principle of *concordia* describes the harmony of the universe. The concept links Fontana's coordination of the event to sixteenth-century literature on choreography and movement. Descriptions of court dances from this era articulate notions of the dancers' bodies, through gesture, movement and time, as

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[272] Fontana, fols. 16v-17r; Sullivan, trans., 30. The passage in the original Italian reads as follows: *Acciò che la punta s'havesse da piegare verso terra, s'era appuntellata dall banda di dietro con due travicelli, ch'erano fermata nell'ultime colonne del Castello, e mentre il piede era tirato, non potendo la punta sforzare li puntelli; si piegò verso terra con grandissima facilità, e acciò che nel piegarsi non havesse dato qualche crollo; s'erano armate cinque traglie, e fermate sopra la volta della Sagrestia, quali risponevano ad alter cinque attaccate alla punta della Guglia, e andorno a guise di briglia temprando di tal maniera il suo calare, che non diede mai scorsa alcuna, e quando fu alla metà dello scendere, perche il peso veniva a corer la maggior parte sopra il piede; cominciò da se stessa à sdrucciolare all'indietro sopra li curli; e non faceva bisogno più di tirarla, anzi fu necessario per frenar questo moto, ch' era troppo gagliardo; armare una traglia, e attaccarla al piede d'essa Guglia, e con quella governarla a beneplacito del Conduttore.*

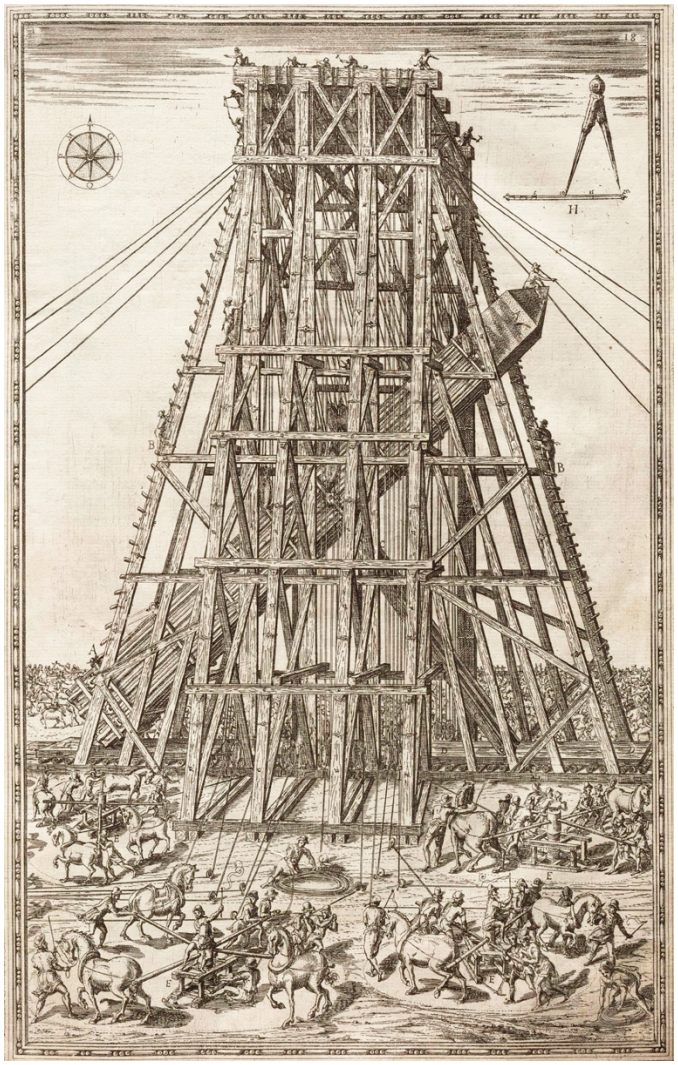

Figure 4.7 View of the *castello*, fol.18r. *Della Trasportatione dell'Obelisco Vaticano*. Digital facsimile from the copy in the Library of Congress. Oakland: Octavo, 2002.

reflections of celestial perfection — the motions of the heavenly spheres. Court festivals of the Renaissance are inseparable from this Neoplatonic philosophy, the use of emblems, symbolic processions, and cosmological beliefs.[273]

Fontana's discussion of the 'concordance' of the *argani* echoes Pigafetta's *Discorso* (1586) by addressing the necessity of concordance between a machine and its parts. Before Fontana, Pigafetta theorized the quantity of windlasses that would be required and emphasized the role of the conductor to oversee the complex arrangement of windlasses.[274] *Concordia*, the personification of harmony, presides over the coordination of the building site in illustrations of the project's initial stages (fig. 4.8). Her figure carries a pillar lowered horizontally across her right knee.[275]

After estimating the size and weight of the obelisk Fontana calculated how many *argani* were required to lift it. To measure, he first approximated the size of the shaft, base, and pyramidion. He then used a small piece of stone, of 'similar make-up', and used its measurements to determine the monolith's total weight. He determined that if each windlass could carry 20,000 pounds, with three or four horses powering each one, then he could lift the

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[273] See Roy Strong, *Art and Power: Renaissance Festivals, 1450-1650* (Woodbridge, Suffolk: Boydell Press, 1984); and Günter Berghaus, "Theatre Performances at Italian Renaissance Festivals: Multi-Media Spectacles or *Gesamtkunstwerke*?" in *Italian Renaissance Festivals and Their European Influence,* eds. J. R. Mulryne and Margaret Shewring (Lewiston, NY: Edwin Mellen Press, 1992) 3-50.

[274] The centrality of the principle of 'concordance' in the representations of the obelisk project has been argued by Adriano Carugo in the essay, "Obelisks and Machines," in the facsimile edition of *Della trasportatione* (Milan: Polifilo, 1978).

[275] See Pierguidi (1998): 158-75, for a discussion of how Guerra reused figures and moved them across the prints of the obelisk project, but also from his other works as well.

obelisk with forty.[276] Five levers were added to the original demonstration model, in case there was any difficulty lifting the obelisk off its base. In order for the operation to work, they needed to have the windlasses work in perfect unison.

The piazza was levelled so that the windlasses could be fitted into the tight space of the Campo Santo. Fontana described the installation of the windlasses at the original site as follows:

> we gradually installed the windlasses after they had been completed and entirely refitted as it can be seen in the drawing. All the blocks were rigged bit by bit, fitting the ends of the cords to their assigned windlasses. Then, so that the deputies in charge of the *castello* could instantly see which windlasses were still, or too slow, or too stressed as they turned, I had the windlasses numbered in order, and likewise the pulleys (each corresponding to its windlasses and to its particular blocks) so that at any time it would be possible to direct from the scaffold which windlass should be slackened or pulled; in this way, the master builders in charge of each windlass could respond instantly and carry out their individual orders with the minimum of confusion.[277]

The numbering system and ordering of the windlasses ensured that the mechanism moved in concert. Each windlass is labeled with the number of men, or *huomini*, (marked as H on the plan) and horses, or *cavalli*, (marked as C) required for the machine's coordination. The machine's performance also relied on well-crafted components, especially the heavy and thick ropes, which Fontana directed the fabrication of himself. By his own estimation, he faced many doubts that he could "bring so many windlasses to bear in concert in order to exert a unified force and raise such a weight."[278] A sequence of commands from Fontana controlled the movement through a system of predetermined sounds and signals. The horses driving the windlasses pulled the ropes

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[276] For Fontana's discussion of the method for determining the size and weight of the obelisk see *Della trasportatione*, fol. 9r; and David Sullivan's translation,"Rules for Measuring Square Needles and Determining Their Weight" (2002), 16.

[277] Fontana, fol. 13r; Sullivan, trans., 23.

[278] Fontana, fol. 10r; Sullivan, trans., 18. William Parsons argues in *Engineers and Engineering in the Renaissance* that Fontana's experiments and calculations rationalized his scheme and silenced any detractors (1939), 160-1.

taut. During the rehearsal, every third or fourth pull, the workers were ordered to stop to check the tension of the ropes. Any discord needed to be manually adjusted. Fontana describes the exactitude of this tuning session, which is also shown in the plan (see fig. 4.8).

> Once the windlasses were marked and all the cords fitted up, we began windlass by windlass to turn them with three or four horses in order to tune and unite their forces, revising this three or four times one by one, until they were all equally tensioned. [279]

A second plan in the sequence plots the installation of the machinery during the lowering phase of the transportation. It features the obelisk's dramatic insertion into the holed wall of the Old Sacristy (fig. 4.9). As a focal point of movement, each windlass (*argano*) on the plan is shown with the exact number of horses and men required to man each station. These points are ordered in the confines of the piazza, fitted inside the sacristy, occupying all sides of the cruciform plan of the *castello*.

Fontana's plans have the complexity of a battle diagram, showing the coordinated movement preparing large teams of animals, the hierarchy of workers with specific roles and movements, and the machine. This understanding of the representation of movement is in keeping with Fontana's predecessor Camillo Agrippa, who sought ways to depict movement. As a diagram, the depiction of circular movement in these plans (epitomized by the circles of the windlasses and their ropes) and the harmonious concert of parts, evokes once again Agrippa's model for fencing, which outlined the ideal movement of the body, at the same time that it referenced the perfect cosmos. The set of directions, labeled so that the movement can be traced

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[279] Fontana, fol. 13r; Sullivan, trans., 23. The passage in Italian reads as follows: *E per la strettezza della piazza fu necessario piantare tre argani nella Sagrestia, & in molti luoghi scavezzare le strade de' canapi con diverse pole, come si vedrà nella seguente pianta: segnati che furno gli argani, & accommodate tutte le corde; si cominciò ad argano per argano a tirarli con tre, e Quattro cavalla per accordare, e univer le forze loro rivendendoli tre, e Quattro volte ad uno ad uno, fino che fussero ugualmente tirati.*

and replicated, overlap with nascent developments in notating movement in dance choreography and the military arts. These treatises would appear much later however, as in the 1715 diagrams of the vertical alignment of swords, based on a circular trajectory of movement from Rada's *Experiencia del'Instrumento armigero espada* (Madrid 1715) (fig. 4.10).[280]

In the narrative Fontana is presented as the hero. "Everything thus being prepared and waiting", he wrote, "I exhorted every man to execute the orders given him when he heard the signal of the trumpet."[281] It was Fontana who signalled the first turn of the windlasses, thus setting the machine in motion. After the final raising at the piazza of St. Peter's, he was carried home with accompanying fanfare. *Condottieri*, a special class of military commanders, were the first to adapt medieval religious pageantry to follow the example of the Roman *imperadori* in their triumphal entries.[282] In order to transmit values of the rulers they used emblems and allegory so that they would be associated with certain ideals. As discussed in the previous chapter, the role of *conduttore* shared its origins with the term *condottiere*.[283]

The chain of command included deputies, who oversaw the movement of the windlasses from the *castello*. The numbering and arrangement of the windlasses included the choreography of the workers' bodies and their movements. All of the workers were under explicit directions concerning their roles and what they needed to do, whether it was coiling the ropes, tending the

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[280] For a discussion on the representation of movement in the military arts, see Sydney Anglo, "The Notation and Illustration of Movement in Combat Manuals," in *The Martial Arts in Renaissance Europe* (New Haven, CT: Yale University Press, 2000), 40-90.

[281] Fontana, fol. 14r; Sullivan, trans., 25.

[282] See Roy Strong, *Splendour at Court*: *Renaissance Spectacle and the Theatre of Power* (Boston: Houghton Mifflin, 1973), 25. The example that Strong cites is Alfonso the Great and his entry into Naples (depicted in a sculptural relief by Francesco Laurana, 1443).

[283] See John Florio, *Anne's World of Words, or a Dictionary of the Italian and English Tongues* (London: E. Blount, 1611), 116.

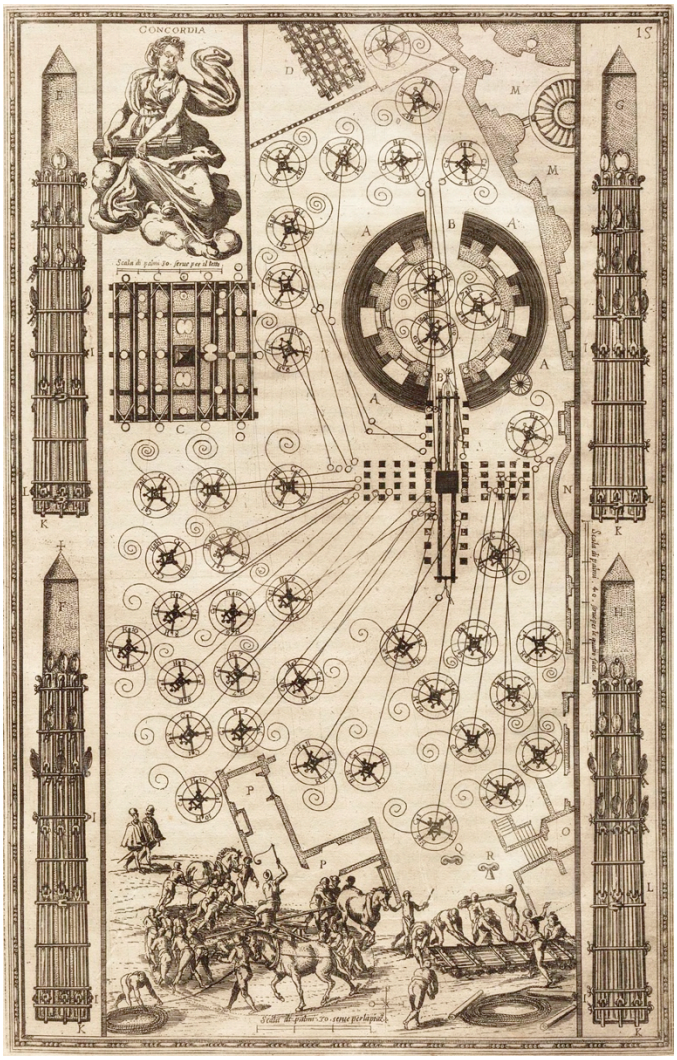

Figure 4.8 Plan view with allegory of Concordia, fol. 15r. *Della Trasportatione dell'Obelisco Vaticano*. Digital facsimile from the copy in the Library of Congress. Oakland: Octavo, 2002.

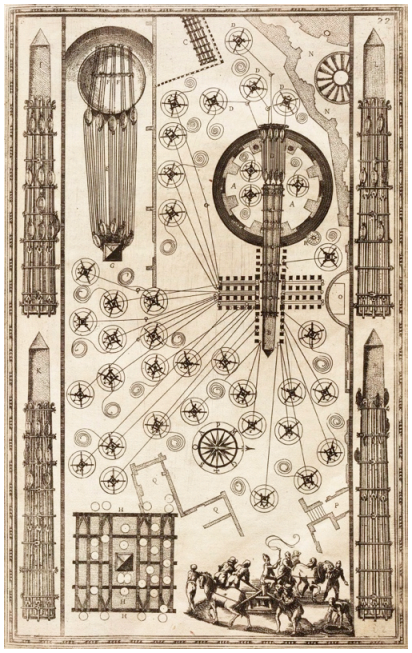

Figure 4.9 Fol. 22r, *Della Trasportatione dell'Obelisco Vaticano*. Digital facsimile from the copy in the Library of Congress. Oakland: Octavo, 2002.

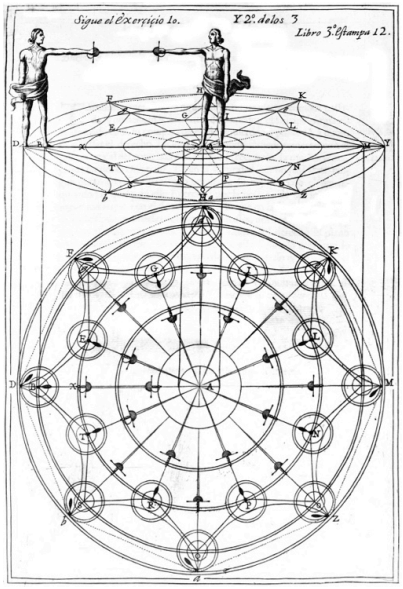

Figure 4.10 Diagram of Fencing. Francisco Lorenz de Rada, *Experiencia del'Instrumento Armigero Espadda.* Madrid, 1705.

horses, ferrying supplies, or watching the *castello*. The appointed captain for each (*capo mastro deputato*) each windlass was fit to "respond instantly and carry out their individual orders with a minimum of confusion."[284] The engravings show the captains wielding whips and commanding the localized movement of each windlass. Having rehearsed the operations beforehand, the workers were also versed in the ceremonial stages of the event. On the day of the lowering of the obelisk, Wednesday April 30, 1585, before sunrise, the workers said "two masses of the Holy Spirit", had taken communion and ceremonially entered through the gate.[285] As part of their contract, they were expected to work without breaks, so as to not disrupt the operation. Fontana commented that the day was considered a great success because the obelisk was moved without injury, and no one was killed while participating in such a dangerous undertaking.[286]

With everyone at their stations and under the pressure of knowing that "practically all of Rome had thronged together" the movement was underway under Fontana's orders:

> Thus having said a *Pater Noster* and an *Ava Maria*, I gave the sign to the trumpeter. When the sound was heard, the work began with the aforesaid five levers, forty windlasses, 907 men, and seventy-five horses. At the first motion, it seemed as if the earth shook, and the *castello* let out a great noise as all its timbers tightened under the weight.[287]

The complex command of this undertaking is captured in Bonifacio's engraving "of the order taken to raise the *guglia*" which was made in August 1586, but before the obelisk was erected at St. Peter's (see fig. 4.1 at the beginning of this chapter). The enveloping crowd formed a barrier, with their backs to the viewer, delineating the boundary of the site of operations. At the centre

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[284] Fontana, fol. 13v; Sullivan, trans., 23.
[285] Ibid.
[286] Ibid.
[287] Fontana, fol .14r; Sullivan, trans., 25.

post, the captain of the Swiss Guard is stationed as a foil to the chaotic crowds.[288] The drawing's labels enumerate the workers and the windlasses, and the placement of the Swiss Guard stationed around the piazza to control the crowd, and at the gates to prevent entry to the site. The machinery's concordance depended on the crowd's adherence to the rules. Fontana issued an ordinance that prevented loud noise, spitting, or any disruption to the smooth execution of the task — under penalty of death.[289] The captains needed to be able to hear the signals of the trumpet and bell, and to listen for sounds of the ropes snapping or failing.

THE SITE OF TRANSLATION: FROM THE OLD TO NEW ST. PETER'S

Reuse of artefacts and materials from ancient projects was not a new practice in the sixteenth century.[290] The 'translation' of columns and the appropriation of large blocks of stone and marble formed a great tradition of St. Peter's building works.[291] Architects at St. Peter's designed the machinery to move large objects for their projects since the fifteenth century. The idea of "*traslare*" implies the force of movement but also a transfer of meaning, for example the

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[288] According to the cartouche on the lower left in Bonifacio's print, August 1586, the role of the captains is to "*vietare la confusione del popolo di fuori*."

[289] Fontana, fol. 13r; Sullivan, trans., 25.

[290] Domenico Fontana kept meticulous records of the materials and tools that were borrowed from the munitions of the *Fabbrica* of St. Peter's. These are kept in Fontana's accounting books: ASR, Camerale I, busta 1527, fasc. 40; AFSP, Arm. 25, D, 99 (f. 41v-45v), and Arm. 27, D, 412; ASV, A.A., Arm B., fasc. 12. Also see Nicoletta Marconi, "*L'eredità tecnica di Domenico Fontana e la Fabbrica di S. Pietro: tecnologie e procedure per la movimentazione dei grandi monoliti tra '500 e '800*," in *Studi sui Fontana: una dinastia di architetti ticinese a Roma tra Manierismo e Barocco*, eds. Marcello Fagiolo e Giuseppe Bonaccorso (Rome: Gangemi Editore, 2010), 45-56.

[291] For a discussion on the definition of *spolia* and its applications in architecture see Dale Kinney's introductory essay (1-12), Michael Greenlagh, "*Spolia:* A Definition in Ruins" (75-96); and Paolo Liverani, "Reading *Spolia* in Late Antiquity and Contemporary Perception*"* (33-54) in the collection of essays *Reuse Value: Spolia and Appropriation in Art and Architecture from Constantine to Sherrie Levine*, edited by Richard Brilliant and Dale Kinney (Surrey, UK: Ashgate, 2011).

transfer of ownership to a new building context.[292] For Fontana and his milieu, 'transportation' connotes the process in its entirety and encompasses a larger set of practices related to the monolith's translocation. Contemporary literature on these activities employs different terms to describe these practices including transfer, transportation, movement, or translation.[293]

Thus far, this chapter has discussed Fontana's articulation of the transportation as a series of smaller moments. The process of "lowering" (*abbassare*) meant first lifting the stone from its ancient base, then suspending it in the rigging, and finally turning it downwards from its base until it was prone on the carriage and ready to be transferred. The next motion encompassed "dragging" the obelisk (*trascinare*) a two-hundred-and-fifty-metre distance to the levelled piazza of St. Peter's. At this stage, the *castello* and the machine had to be reinstalled. *Della trasportatione* does not have a site plan showing the pathway of the relocation (or marking the distance between the obelisk's initial and final placement).

The change of place, and how it is demarcated through the obelisk's physical and temporal displacement, is best presented in Guerra and Bonifacio's composite image of *The*

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[292] In the definitions provided by Dale Kinney in *Reuse Value*— "spoliation entails a forcible transfer of ownership."(4). The implications of this definition certainly apply to the Egyptian artefact that was brought to Rome by Caligula. And it carried this history with it (as it was narrated by Pliny and Ammianus Marcellinus). S*polia* according to Kinney are notable as "survivors of violence". In the case of the Vatican obelisk, the orb had been effected by the muskets of the invaders of Rome in the fourteenth century. Kinney also argues that with spoliation, the monument takes that burden with it, what he calls "the burden of testimony". This status is especially apparent for the Vatican obelisk, as the witness of St. Peter's martyrdom, this is no less apparent.

[293] See Nicoletta Marconi, "*La traslazione dei grandi monoliti: empirismo e technologia,*" in *Edificando Roma barocca: Macchine, apparati, maestranze e cantieri tra XVI e XVII secolo* (Rome: Edimond, 2004), 230-41.

Stages of Moving the Vatican Obelisk (1586).[294] This print recreated the event, and captures both the *castello* and the obelisk in varying positions and angles as they move through consecutive stages of the process (see fig. 4.2).[295] On the far left, the obelisk is depicted prior to its removal, placed in the narrow alley and with the bronze orb at its apex. The obelisk also bears the inscription that generated its myth as a funerary monument, foreshadowing its transformation from a pagan to a Christian monument. The depiction of movement flows to the right, with the next stage encompassing the obelisk being lowered to a 45-degree angle within the framework of the *castello*. In this second view, the aforementioned orb has now been removed and the orientation of the obelisk shifted (since we can no longer see the inscription dedicated to Augustus). In the foreground, the prone obelisk is being dragged toward its new destination and then subsequently in the process of raising in the rebuilt form of the *castello*. The final scene, on the far right, shows the obelisk after its erection, with its new ornament, including the Sixtine emblems on its summit.

Della trasportatione articulates a moment between the obelisk's lowering and its transportation. Once the stone descended, it was pulled from the *castello* so that it might traverse its path to the piazza of St. Peter's. One of the drawings in the sequence of movement shows the scaffold in perspective, with the horizontal figure of the obelisk projecting towards the picture plane (fig. 4.11).[296] It is after this moment in the process that the scaffold was dismantled so that

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[294] This phenomenon occurs in the Bonifacio engraving Stages of Moving the Vatican Obelisk, 1586 and the sequence of images that evolved out of it in *Della trasportatione*, especially the plates that feature the translocation.

[295] This monumental print is dated from after September 11, 1586. It illustrates "The Stages of Moving the Vatican Obelisk" including the lowering, transportation and final placement.

[296] Fontana, plate 10r. This plate shows the placement of the obelisk on the sledge and the *castello* just prior to its disassembly.

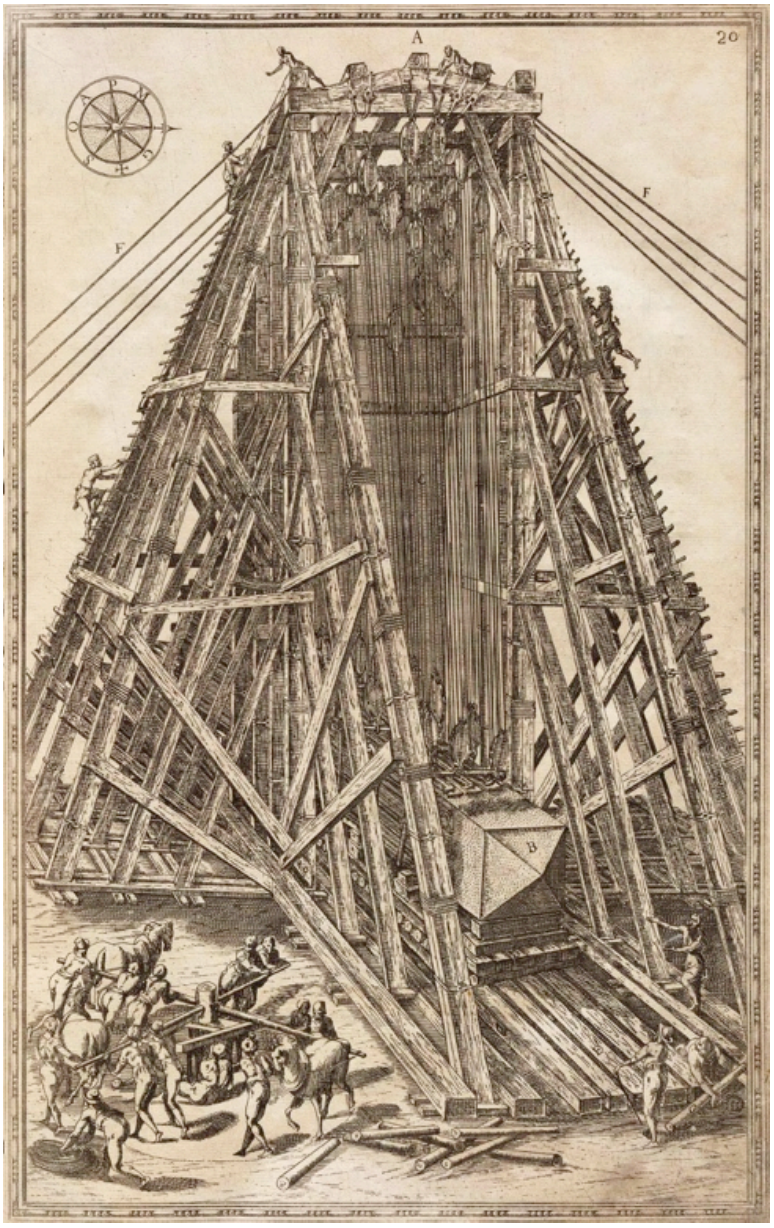

Figure 4.11 View of the *castello* with obelisk in its cavity, fol. 20r. *Della Trasportatione dell'Obelisco Vaticano*. Digital facsimile from the copy in the Library of Congress. Oakland: Octavo, 2002.

it could be re-erected. Fontana commented that, "At the same time, we dragged the lumber from this place to the piazza of St. Peter."[297] This transitional stage is not included in the prints by Guerra and Bonifacio produced immediately after the event occurred. Its depiction in Fontana's book thickens the representation of the event's ephemerality.

The route to the piazza of St. Peter's was slightly lower than the original placement. They had to level the slope again (out of manufactured earth) in order to transport the obelisk.[298] The obelisk project is thus physically intertwined with the history of St. Peter's. Fontana performed a series of acts associated mythically with the founding of a city: levelling, mound building, arranging, and setting boundaries. When Constantine constructed the basilica in the fourth century, the site had to be razed. Fontana's taking of the earth from the Vatican hill, as a means to build the embankment leading the obelisk to its new site, is underpinned with the powerful symbolism of a ceremonial rite. The new site for the obelisk was approximately 40 Roman palms, (or nine metres), lower than the previous elevation of the obelisk. It also needed to be moved one hundred and fifty *cannes* (approximately two-hundred and fifty metres). In order to account for this change, Fontana's plan was to build an "inclined causeway" according to the following specifications: thirty-seven palms high, one-hundred palms at its base and fifty palms wide on top. It was made from wooden beams and planks, and was filled with earth taken from the Vatican hill. It would then be built around the scaffold that was remade in the piazza of

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[297] Fontana fol. 23r; Sullivan, trans., 32.

[298] Joseph Rykwert's seminal study, *The Idea of a Town: The Anthropology of Urban Form in Rome, Italy and the Ancient World* (Cambridge, MA.: MIT Press, 1988), describes the mythic origins of the city in relation to a series of rites and ceremonies (or festivals) inspired by the story of Romulus and Remus. Rykwert explained that the approach to urbanism was based on this concept or model of the city (as opposed to the other way around).

St. Peter's. The drawing thus showed the construction of this form, as well as the obelisk in the process of travelling.[299]

THE OBELISK'S RE-ERECTION AND ITS CONSECRATION

The obelisk's re-erection, alignment and then its consecration was the last phase of movement. The present section focuses on the representations from *Della trasportatione* that encapsulate the spectacle of the machine lifting the obelisk in the piazza of St. Peter's. These images condense the process into a revealing series of views of the machine: the rebuilding of the *castello*; the arrangement of blocks and tackle for the raising; the preparation of the rigging for the obelisk to be erected once positioned underneath the wooden framework, and an aerial plan demarcating the barrier, the space for the causeway and platform, and the windlass arrangement (see figs. 4.13-4.15 and fig. 5.14). I examine this micro-sequence of images, as part of the larger process of transportation, and for how they reveal the event's complex unfolding. They capture an ephemeral architecture as the machine is remade and reactivated during the final raising.

The climax of the transportation took place on Wednesday, September 10, 1586.[300] Fontana marvelled at the spectacle of the last movement. As the point of the obelisk was raised, four windlasses installed opposite, continuously pulled the monolith's foot forward. A set of lines pulled upwards, working vertically. In this way, they did not, Fontana argues, have to be pulled from behind the obelisk in motion, and so as to eliminate the need for counterbalance if the movement was interrupted. This process, he explains, was just "as the ancients must have

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[299] Fontana, fol. 23v; Sullivan, trans., 34.

[300] Fontana delineates the process of the obelisk's re-erection in the piazza of St. Peter's in the section, "Erection and Adjustment of the Needle," *Della trasportatione*, fols. 33r-33v.

done".[301] The work proceeded via a series of controlled movements. One sound from the trumpet signalled a turn, and the bell directed its cessation. After it was raised halfway, the stone was buttressed so that the workers could take a break. By the end of the day, the obelisk had been moved on top of the pedestal. Fontana writes that "The needle was raised in fifty-two turns, and it was a beautiful spectacle in many respects."[302] A burst of artillery fire at the Castel Sant'Angelo celebrated the success.

An elevation documented preparations for the stone's hoisting. The drawing shows the *castello* above the reinforced berm, the cross-braces and the tower's reinforced construction (fig. 4.12). The wooden framework was reconstructed from eight columns that were planted into the openings left in the foundations. They were made as before with the same components: hoops (*cercchi*) and bolts (*chiavarde*) and reinforced with buttressing. The earthen hill was buttressed with a dense series of "transverse members and bolted together and reinforced."[303] This artificial topography, made up of the earth taken from the Vatican hill, readied the site for the obelisk's raising. The next drawing in the sequence shows the attachments of the blocks and tackle for the obelisk's raising. I elaborate on this image of the apparatus in the next chapter (see fig. 5.7), however from the standpoint of explicating the obelisk's movement as a process, this image purposively shows the three sides of the obelisk that were exposed prior to its re-lifting. It marks the pulley system, with each windlass connected to three in total: one at the base of the *castello*, one at the hill's edge, and one at the base of the piazza.

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[302] Fontana, fols. 33r-33v; and Sullivan, trans., 38-9.
[303] Fontana, fol. 25r; Sullivan, trans., 36.

Figure 4.12 The obelisk traversing the causeway, fol 24r. *Della Trasportatione dell'Obelisco Vaticano*. Digital facsimile from the copy in the Library of Congress. Oakland: Octavo, 2002.

While the structure was being built, the foundations were being laid in the piazza, and covered with a floor of travertine. During the assembly of the socle and the base of the pedestal, commemorative objects were laid in between the marble slabs.

> The pieces of this socle, which numbered three, were placed one-third of a palm apart from each other to form a bit of relief on the sides, adding a certain grace to them in this proportion. Between two of these pieces, a slab of marble was placed in which was inscribed in Latin the name of Our Lord, and a succinct account of the manner of accomplishing this whole undertaking; the given name, last name, and fatherland of the architect, and the date in eternal memory.[304]

The earthen hill, with reinforcements, was made to come up to the level of the pedestal. Although this assembly is somewhat unclear in the *Della trasportatione* drawings, it is much clearer in Carlo Fontana's *Tempio Vaticano* where the pedestal and base is shown. In Domenico's sequence, the cross-section shows the obelisk and *castello* in position for action (fig. 4.13). "In the following drawing", the text explains, "the *castello* is shown open on one side, with the point of the *guglia* drawn inside of it and the ropes that supported it."[305]

An aerial view of the machine in *Della trasportatione* depicts the barricade surrounding the worksite and the platform.[306] The "mountain" of earth forms the causeway, and at its centre is the *castello*, cruciform in plan, with the horizontal obelisk. The architect's command post is marked on the plan as "the high place". It is not shown in plan like the *castello* or the barricade, rather it is shown in parallel perspective to the ground plane, and matching that of the wind rose compass soaring above (see fig. 5.14 in the next chapter).

During its transportation the monolith changed from one thing (a pagan artefact buried in the sand), to another —a symbol of Christianized Rome. Once it had been re-erected in the

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[304] Ibid.
[305] Fontana, fol. 29r cartouche; Sullivan, trans., 37.

piazza of St. Peter, it needed to undergo a final cleansing, so that it might be brought out of the shadows into the divine light. Several engravings of the project and its final stage, have illustrated this image of the obelisk standing before the church. The monument was now prepared for its new function as the beacon of St. Peter's basilica. In the eyes of Sixtus V, the transportation and its conversion, were necessary stages in the process. By necessity, the obelisk's conversion involved not only the change of place, but also entailed a change in its inherent physical qualities.

To understand this process we turn again to the writings of Michele Mercati, who delineated the consecration ceremonies in *Gli obelischi di Roma* (1589). How is it that a 'pagan idol' – an artefact of ancient Egypt — could be "converted" through the process of moving it? In the context of pilgrim literature and the ritual practice of circumambulation, there is the idea that the movement of the body is a spiritual, metaphysical act — one of contemplation and introspection. In the case of the obelisks, they are converted through their physical "ruining". In Mercati's discourse, the ruin of the obelisks is at the hands of the Egyptian rulers who succumbed to hubris and corruption. Once they were transported to Rome as objects of conquest, they became the property and symbols of the Roman Empire. Their final conversion and 'consecration' would be the work of Sixtus V, who moved them again so that they might be physically, morally, and temporally aligned with the church. The language of papal reform in the sixteenth-century often referred to 'rectitude' and 'propriety'. The vertical form of the obelisk, standing erect and proper in front of the basilica seemed an appropriate symbol for this orthodox papal regime.

Fontana made considerable efforts to adjust and straighten the obelisk on its new pedestal before fusing it to the base.[307] For the next seven days, the windlasses were 'moved and reinstalled' with the 'blocks attached to all four faces of the needle' so that it may be adjusted. In order to do this, they had to bring in four large levers (made of huge beams 70 palms long) so that they could remove the sledge. First they tightened the windlasses and then pressed down on the four levers to lift the obelisk a little bit. They buttressed it and then once secure, they slid the carriage away. They then knocked out the wedges so that it would be fused to the bones. It took some time to adjust it and to make sure that it was properly straight.[308]

Camillo Agrippa's proposal viewed the vertical alignment of the obelisk as something that had to be preserved throughout the process of transportation. Agrippa's machine had privileged the vertical orientation of the obelisk. In Domenico Fontana's method – the process of the obelisk's transportation is a more refined articulation of movement. The last state of the obelisk's transformation – its re-erection—incorporated its alignment and its ritual consecration. A visual representation is shown in Giovanni Guerra's drawing (1587) where the obelisk's shadow is pointing towards an image of St. Peter's. In this image, the obelisk is now aligned (after its movement and its raising) with the face of new St. Peter's. The obelisk's shadow is cast on the pavement of the piazza and points directly towards the church. It reminds us of the obelisk's path, as it tread the earth. Its shadow as an index of time, the obelisk-gnomon reflects

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[307] Interestingly, as Bernini lamented in the following century, the obelisk was actually off-centre and not properly positioned in terms of the cardinal points or of the façade of St. Peter's. See Cesare D'Onofrio, *Gli obelischi di Roma* (1992), 153-8.

[308] Fontana, fol. 33v; Sullivan, trans., 38-9.

the process of the obelisk's movement both symbolically aligning it with the church and referencing its journey as it was dragged to its new placement (fig. 4.14).[309]

The obelisk was consecrated in a benediction ceremony on September 28, 1586.[310] The procession and consecration "cleansed" the needle from impurities, in order to prepare it for the addition of a cross at its summit. The celebrants included missionaries, chaplains, lords, singers, musicians and canons, who were led by officiant Bishop Ferratini through the piazza and "climb(ed) the earthen mountain to the altar placed at the face of the needle toward the church."[311] The reprint in the 1590 edition of *Della trasportatione* dramatically changed the image of the benediction from its previous interation (fig 4.15). The shadow of the obelisk is now pointing at St. Paul instead of directly at the facade of St. Peter's. The artillery, the standard bearers and the full procession are no longer depicted. These details are now instead described in the text.

An account of the blessing appeared in *Della trasportatione* as detailed as the specifications for how to build the *castello*. The ceremony began when the Bishop Ferratini, adorned with a miter, reached his arm out to the obelisk and said, "I exorcize you, etc."[312] He subsequently removed the miter from his head and recited the customary verses of prayer. The

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[309] This commemorative print showing the obelisk's final placement is one of the rarest of those produced by Bonifacio from 1586-1587. A reproduction appears in Curran et al, *Obelisk a History*.Corinne Mandel's study of Sixtus V's relationship to divinatory practices, as well as the use of alchemical symbolism in Sixtine iconography, has touched on the potential for an alchemical reading of the Vatican obelisk project and its representation. See Mandel, *Sixtus V and the Lateran Palace* (Rome: Istituto Poligrafico e Zecca dello Stato, 1994).

[310] Fontana, *Della trasportatione* fols. 33v-34v; Sullivan, trans., 40-2. Fontana provides details of the benediction ceremonial rites in the section "Description of the Procession Made to Purify and Bless the Needle and to Consecrate the Cross Atop It". Mercati's *De gli obelischi di Roma*, discusses the procession in the chapter, "On the Consecration of the Obelisks", Cantelli, ed. (1981), 305.

[311] Fontana, fol. 33v; Sullivan, trans., 40.

[312] Ibid.

deacon passed the bishop a branch of hyssop. He then circled the monument three times, while the deacon held his cope, and an acolyte brought holy water, which was sprinkled in a systematic fashion. He then blessed the needle by making the sign of the cross. Once purified in this manner the deacon passed the cross to the bishop who raised it. Along with the clerics to help him, they pulled the cross to the top while singing a hymn. More prayers were said and then the bishop "incensed" the cross at the obelisk's summit.[313]

Fontana's drawings limned the concept of movement as a metaphysical process of transformation. As this chapter has shown, the form and tectonics of the *castello*, the harmonious coordination of the site, and the rituals intended to perform the obelisk's conversion, implicitly defined 'transportation', Fontana adopts in *Della trasportatione*. The broader historical practice of translating monoliths is given a new dimension of meaning in the architectural practice of the sixteenth century. As we shall see in the next chapter, Domenico's conceptualization of the project, as epitomized by his understanding of "transportation" and "translation", are further transformed in the seventeenth century. How the new vision of machines and movement is tied to the shift toward a mechanized world picture – is the subject of the next chapter.

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[313] Ibid.

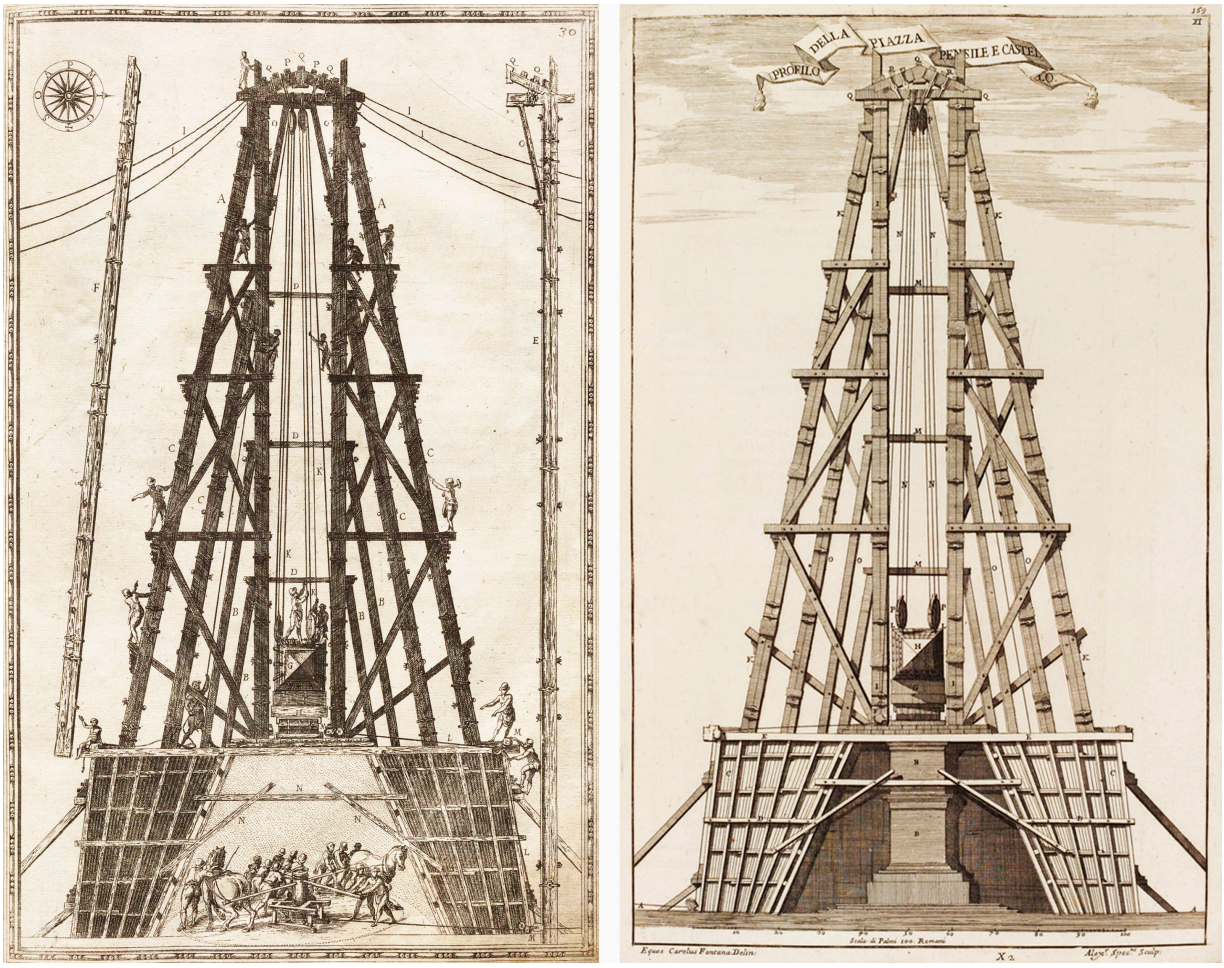

Figure 4.13 On the left: Section of the *castello* after reassembly, fol 30r. Domenico Fontana, *Della Trasportatione dell'Obelisco Vaticano*. Digital facsimile from the copy in the Library of Congress. Oakland, Octavo, 2002; On the right: View of the Raised platform and *castello*. Carlo Fontana, *Tempio Vaticano*, p. 162.

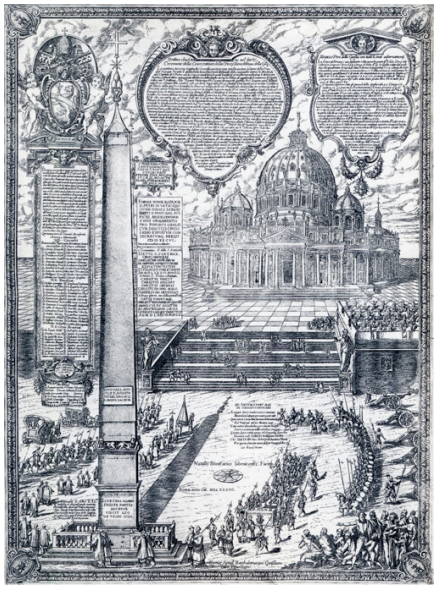

Figure 4.14 Natale Bonifacio after drawings by Giovanni Guerra. *Benediction Ceremony of 1587*. Curran, Brian et. al., *Obelisk: A History*. Cambridge, MA: Burndy Library, 2009, p. 140.

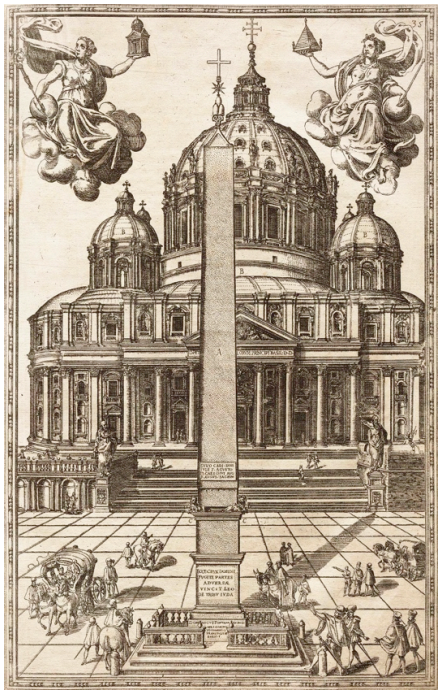

Figure 4.15 The final placement of the obelisk in front of St. Peter's. Fol 35R. *Della Trasportatione dell'Obelisco Vaticano*. Digital facsimile from the copy in the Library of Congress. Oakland: Octavo, 2002.

CHAPTER 5

LATER INTERPRETATIONS OF THE VATICAN OBELISK PROJECT

In 1604, Fontana released an expanded two-volume version of *Della trasportatione* (Naples, Costantino Vitale).[314] The second volume broadens the treatment of his Roman career to cover urban renewal projects for Sixtus V including the translation of the Scala Santa at San Giovanni in Laterano.[315] The appended volume also featured public works executed in Naples after his arrival in 1592.[316] In the dedication, Fontana writes,

> In the year 1590, having sent into light, the way taken in transporting the great Vatican obelisk, located today in the square of St. Peter's in Rome, with the other three, one in front of the Church of St. John Lateran, the other before the Church of Santa Maria del Popolo, and the third at Santa Maria Maggiore, with many other buildings I made by order of Pope Sixtus V, as his Architect General, and after having such works placed into execution, as many in Rome, as in Naples, so that in drawing, and in writing you can see those that could not be seen in the previous work. I wanted to please, and benefit the students of this profession by sending to publication these few drawings, insurance of the great number I hope to soon send out.[317]

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[314] *Libro Secondo in cui si ragiona di alcune fabriche fatta in Roma, et Napoli, dal Cavalier Domenico Fontana* (Naples: Costantino Vitale, 1604). This second volume is included in the facsimile edition of *Della trasportatione dell'obelisco Vaticano* (Milan: Polifilo, 1978).

[315] For more on Domenico Fontana's transportation of the Scala Santa see Helge Gamrath, *Roma Sancta Renovata. Studi sull'urbanistica di Roma nella seconda metà del sec. XVI con particolare riferimento al pontificato di Sisto V* (1585-1590) (Rome: L'Erma di Bretschneider, 1987); and Christopher L.C.E Witcombe, "Sixtus V and the Scala Santa," *Journal of the Society of Architectural Historians* 44, no. 4 (Dec. 1985): 368-79.

[316] For a comprehensive study on Domenico Fontana's Neapolitan career and its omission from scholarship see Paola Carla Verde, *Domenico Fontana a Napoli 1592-1607* (Naples: Electa, 2007).

[317] My translation. Fontana, "*Ai Lettori*", *Libro Secondo* (1604), fol. 1v.

The engravings by Guerra and Bonifacio, which celebrated the pinnacle of Domenico Fontana's achievement as chief architect to the pope, began recirculating amongst specialists via new publications in the seventeenth-century.[318] Chief among these were texts on antiquities and cartography; but of particular relevance to this dissertation, is Carlo Fontana's interpretation of St. Peter's basilica in the *Tempio Vaticano* (Rome, 1694). His research contextualizes the translocation of the obelisk in seventeenth-century architectural theory and privileges Domenico's project with a key role in the formation of the new St. Peter's.[319]

The prevalence of imagery from *Della trasportatione* in the aforementioned literature marks an epistemological shift associated with the ascendency of mechanical philosophy in the seventeenth century. This chapter places these new interpretations of the project within a transformed conception of the world picture and the philosophy of movement. In order to demonstrate how Domenico's project is now interpreted under the lens of modern mechanics, I compare the drawings from *Della trasportatione* (1590) to their modified analogues in the *Tempio Vaticano* (1694). To provide a proper context, however, I must first offer a brief chronology of the major seventeenth-century accounts of the Vatican obelisk project.

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[318] In places in this chapter, particularly where both Fontanas are mentioned, I will refer to Domenico Fontana by his first name. The same rule will apply to references to his relative Carlo Fontana. The intention is to keep the careers, motivations and publications of the two Fontanas distinct for the reader.

[319] Carlo Fontana's great work is written in both Latin and Italian. Its full title is *Templum Vaticanum et ipsius origo cum Aedificiis maxime conspicuis antiquitus & recens ibidem constitutes; editum ab equite CAROLO FONTANA; Il Tempio Vaticano e sua origine, con gli Edifitii più cospicui antichi, e moderni fatti dentro, e fuori di Esso; descritto dal Cav. Carlo Fontana* (Rome: Francesco Buagni, 1694). I will refer to the text by its Italian title, since that is the language that I have read it in and because that is the language of its first important modern reproduction: *Il Tempio Vaticano: 1694,* ed., Giovanna Curcio (Milan: Electa, 2003).

THE OBELISK PROJECT AND ITS AFTERIMAGE (1604-1694)

The first re-interpretation of the project appears in Vincenzo Scamozzi's *L'Idea della architettura universale* (Venice, 1615).[320] Scamozzi, who drew from his firsthand account of the event, had no interest in lauding Domenico Fontana. His discourse is guided by the fundamental domains of architectural knowledge defined by Vitruvius: machines, gnomonic devices, and buildings.[321] Without crediting the *conduttore*, Scamozzi critiques the assembly and composition of the *castello* by reconstructing the project in considerable detail (including how the obelisk was encased for protection before being lowered onto the sledge). He also recounted how the obelisk was raised with the force of eight hundred men and one hundred and forty horses.[322] Similar accounts of the project from the mid-seventeenth century, as we shall see, had a very different focus and reused published images of Domenico's enterprise. Scamozzi's voice provided the only exploration of the project from an architectural perspective until much later in the century.

Since his arrival in Rome in 1635, Athanasius Kircher had been acquiring an unrivalled expertise on the Sixtine obelisks, Egyptian antiquities, and Near Eastern texts, via the collections of his patrons.[323] His mission to unravel the mystery of hieroglyphs, summarized in *Obeliscus Pamphilius*, led directly to the excavation of the Pamphilian obelisk, the centrepiece of Bernini's Fountain of the Four Rivers in the Piazza Navona. However, his omnibus in three tomes, entitled

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[320] Scamozzi, "*De gli obelischi antichi di Roma, e de' modi, che furono proposti, & effetuati per trasportar a' tempi nostril quello di Vaticano,"* in *L'Idea della architettura universale,* Parte Seconda, Libro Ottavo, Cap. XIX, (1605), fols. 336r-338r.

[321] Vitruvius, *The Ten Books on Architecture*, trans. Morris Hicky Morgan (New York: Dover, Book I: Chapter III, 160.

[322] Scamozzi, (1605), fol. 337r.

[323] For a discussion of Kircher's fascination with obelisks in the context of seventeenth-century Oriental studies see Daniel Stolzenberg's PhD dissertation, "Egyptian Oedipus: Antiquarianism, Oriental Studies, and Occult Philosophy in the Work of Athanasius Kircher." PhD diss., Stanford University, 2003.

Oedipus Aegyptiacus (Rome, 1652-1654) piqued a burgeoning interest in the Vatican obelisk project during a seventeenth-century revival in Egyptian artefacts.[324]

The first two volumes of this grand opus serve as a compendium of Egyptian esoterica.[325] A section on "Hieroglyphic Mechanics" in the second tome, analyses the construction of the pyramids, the science of weights, and other large-scale works produced by the ancient Egyptians. The final tome presents his record of obelisk translocations in Rome (outside of the Pamphilian one). Kircher's exegesis of the *Trasportatione* offers a comparatively brief explanation of Fontana's machinery with a small woodcut of the *castello* (fig. 5.1), and a representation of the repositioned obelisk (fig. 5.2).[326] This small section devoted to the Vatican obelisk is subsumed within the hundreds of pages that encompass the third tome of the *Oedipus Aegyptiacus*. Even though it does not have hieroglyphs to be deciphered, the Vatican obelisk's importance can be attributed to its special place as the first object of fascination during the 'megalithomania' of the late sixteenth century.[327] Similarly, in Kircher's time, there were approximately forty obelisks

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[324] For more on Kircher and the obelisks see Richard Krautheimer, *The Rome of Alexander VII*, 1655-1667 (Princeton, NJ: Princeton University Press, 1985); Brian Curran, *Egyptian Renaissance* (2007), 283-7; also Brian Curran et al, "Baroque Readings: Athanasius Kircher and Obelisks," in *Obelisk a History* (Cambridge, MA: Burndy Library, 2009) 161-77; and Eugenio Lo Sardo, "Kircher's Rome" in *Athanasius Kircher: The Last Man Who Knew Everything*, ed. Paula Findlen (New York: Routledge, 2004), 51-62.

[325] The first of these volumes, 'The Temple of Isis', looks at the origins of Egyptian superstition and idolatry. The second tome, 'The Egyptian Gymnasium' is a compendium of all Egyptian knowledge that is encoded in the hieroglyphs. It is divided into twelve 'classes' or sections, including symbolism, language, astronomy, divination, religion, mechanics, thaumaturgy, medicine, alchemy, magic and theology. Athanasius Kircher, *Oedipus Aegyptiacus, Tomus III, Theatrum Hieroglyphicum, Syntagma XI, Obelisci Rasi*, 367-77.

[326] Presumably this illustration is derived from the Guerra/Bonifacio engravings. Kircher's breakdown of the components echoes the 1586 engraving of the obelisk's stages of transportation.

[327] Erik Iversen uses the apt term 'megalithomania' to describe Sixtus V's drive to continue raising obelisks following the successful raising of the Vatican obelisk. See Iversen, *The Obelisks of Rome*, vol. 1 of *Obelisks in Exile* (Copenhagen: Gad, 1968), 47.

adorning Rome's public spaces.[328] For the purpose of this study, Kircher's work should be considered as a successor to Michele Mercati's *Gli obelischi di Roma* (1589), particularly due to the latter's account of Egyptian idolatry, the origins of the obelisks and hieroglyphs. Unlike Mercati's genealogy of Roman obelisks however, images played an important role in Kircher's *Oedipus Aegyptiacus*.[329] Kircher presents examples of machines, for instance a device for raising heavy weights (fig. 5.3). Ancient machines are used as examples of the divine knowledge that has been encoded in the Egyptian hieroglyphic language on antiquities.

Domenico Fontana's work coincided with a culture of narrating the experience of movement, including pilgrimage guides and festival books. A genre of literature carved out of the new print culture referred to as *ars apodemica* or the 'art of travelling' flourished in the 1580s.[330] The genre was concerned with accumulating knowledge of a locale. These texts elucidated ways for a traveller to engage with one's surroundings while physically moving through a place. The process of narrating experience, involved a description, in both text and image form. In this context, the *Theatrum civitatum* (Amsterdam, 1663), a collection of maps by the Dutch cartographer Joan Blaeu, is an exemplary work. Blaeu purchased the original plates by

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[328] See Eugenio Lo Sardo, "Kircher's Rome," in *Athanasius Kircher: The Last Man Who Knew Everything*, ed. Paula Findlen (New York: Routledge, 2004), 51-62.

[329] Although Daniel Stolzenberg discusses the origins and meanings of Kircher's *Egyptian Oedipus* in the antiquarian culture of the seventeenth century, I was unable to find direct discussion of the origin of the images in this text.

[330] Thomas Frangenberg defines *ars apodemica* and looks at proponents of this genre of literature in the sixteenth-century in "Chorographies of Florence: The Use of City Views and City Plans in the Sixteenth Century," *Imago Mundi* 46 (1994): 41-64. Ignazio Danti, the geographer and cartographer, is named as one of the innovators of this literature despite never using the term. In his work, "On observations of voyages" Danti describes how a traveller experiences a place, and how this can amount to a formal observation; see Frangenberg (1994), esp. 50-6.

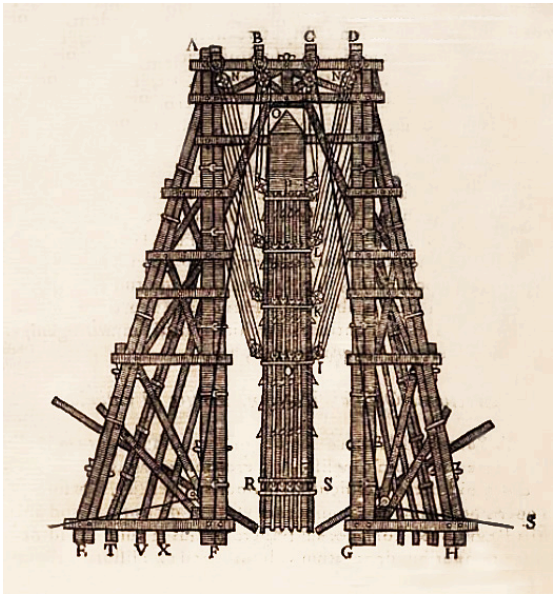

Figure 5.1 The Vatican obelisk project, *castello*, in Athanasius Kircher, *Oedipus Aegyptiacus, Tomus III, Theatrum Hieroglyphicum, Syntagma XI, Obelisci Rasi*, 1654.

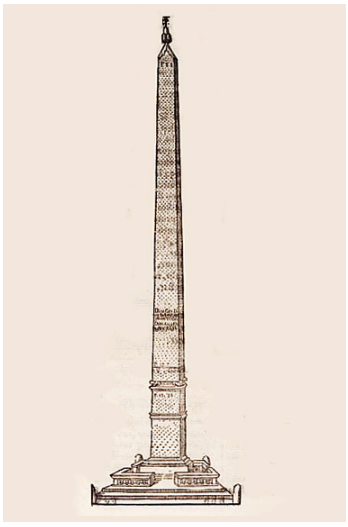

Figure 5.2 The Vatican obelisk in Athanasius Kircher, *Oedipus Aegyptiacus, Tomus III, Theatrum Hieroglyphicum, Syntagma XI, Obelisci Rasi*, 1654.

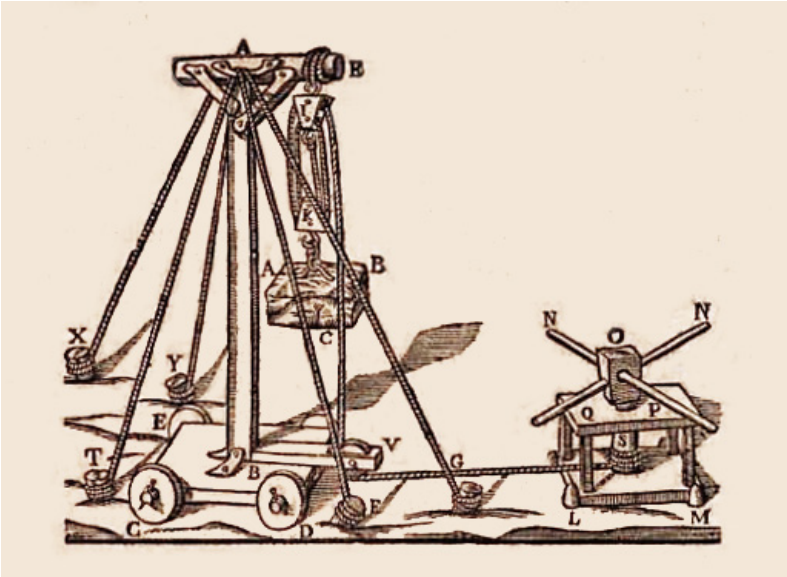

Figure 5.3 Devices for raising heavy weights. Athanasius Kircher. *Oedipus Aegyptiacus, Tomus II,* 1654.

Bonifacio from *Della trasportatione* and inserted them into a visual history of Italy. In this cartographic expression of *ars apodemica*, the obelisks, the pyramids and other notable monuments function as set pieces in the map of seventeenth-century Rome. Blaeu's atlas thus exploits Guerra and Bonifacio's imagery and also that of Étienne Dupérac depicting the Villa d'Este. Both Dupérac and Antonio Tempesta were known for their insertion of obelisks and antique monuments in Baroque cityscapes and maps as points of orientation.[331] Blaeu's vision should be recognized for reaching beyond cartography and antiquarianism to celebrate Domenico's machines as part of this landscape. Blaeu's treatment of the images, (even as a direct appropriation), is important for the shift in the mode of representation, and for broadening the context for Fontana's work. [332]

Another seventeenth-century biography of Fontana's achievements, worthy of consideration is Giovanni Baglione's *The Lives of Painters, Sculptors and Architects* (1642). Baglione described how Domenico's experience in "the practice of building" made him a competent architect and prepared him for the demands of Sixtus V's ambitious building program.[333] Following a summary of Fontana's development as Sixtus V's chief architect, Baglione describes the essence of the Vatican obelisk project and its legacy:

> The *Cavaliere* did great diligence, and with different opinions of other excellent architects of these times set to work, and after much hardship, and great expense, with *castelli* of wood, that had raised a larger dome, that it had been, finally from the first site,

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[331] For more on Roman monuments and their impact on urban experience see Rebecca Zorach, *The Virtual Tourist in Renaissance Rome: Printing and Collecting the Speculum Romanae Magnificentiae* (Chicago: University of Chicago Library, 2008).

[332] For more on the shifting representation of architecture and topography in seventeenth-century atlases see Renzo Dubbini, *Geography of the Gaze: Urban and Rural Vision in Early Modern Europe*, trans. Lydia G. Cochrane (Chicago: University of Chicago Press, 2003).

[333] Giovanni Baglione, *Le Vite de' Pittori, Scultori, et architetti*…(Rome: Andrea Fei, 1642), 84.

> lifted it, lowered it, lead it, and in the place were today one admires it, re-erected it, and set in place, as can be seen.[334]

The conclusion of Baglione's biography ends on a darker note. After the pope's death, Baglione recounts, "Domenico Fontana's name fell into disrepute on the stage of Rome, and so he fled to Naples." While he was able to recover his reputation somewhat, and created the post of the "*Ingegnere generale*" for the King of Naples, he ultimately died deserving of much more accolades for his career.[335]

By contrast, Fontana's inclusion as the sole architect (alongside fifteen artists including Caracci and Caravaggio) in Giovan Pietro Bellori's *Lives of the Modern Painters, Sculptors and Architects* (Rome, 1672) bestows unparalleled stature upon his oeuvre.[336] Bellori's profiles include a portrait, a detailed exposition of their artistic career and an assessment of individual achievements. Fontana's story is graced with two engravings. One depicts Fontana's effigy with the obelisk, marked with an epitaph dedicated to its translocation (fig. 5.4). The second is a solemn figure, personifying Geometry (fig. 5.5). Here is an architect who is most famous and celebrated for the erection of the obelisks—of "eternal fame" as Bellori put it—a task long desired by the popes and also one that was very difficult to carry out. Bellori acknowledges that his account draws from Fontana's writings:

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[334] My translation. The passage from "*Vita del Cavalier Domenico Fontana, Architettore*, reads as follows: "Il *cavaliere vi fece grandissima diligenza, e con diversi pareri d'altri architetto eccellenti di quei tempi misesi all'opera, e dopo molte fatiche, e grandissime spese con castelli di legname, che havebbono alzata una cupola per grande, che ella fusse stata, finalmente dal primo sito, l'alzò, la calò, la condusse, e nel luogo dove oggi si ammira, la rialzò, e misi in opera, come si la veduto.*" Baglione, *Le vite* (1642), 84-5.

[335] Ibid, 86.

[336] For a complete modern English translation of Giovan Pietro Bellori's text see *The Lives of the Modern Painters, Sculptors and Architects: A New Translation and Critical Edition*, trans. Alice Sedgwick Wohl (Cambridge, UK: Cambridge University Press, 2005).

> For this reason we have elected to write the life of this artist in memory of such a famous enterprise, following for the most part Domenico's own writings, for he published very thorough commentaries on these erections of obelisks and on his other works, with illustrations, and we shall dwell at length upon the apparatus and the machinery, with the thought that the novelty and the magnitude of the work must make the account of it delightful and bring glory to art."[337]

This introduction shows that he is largely indebted to Fontana's own accounts of the event. After a brief overview of Domenico's early training in Melide, Bellori recounts his first works with Cardinal Montalto (later Sixtus V) and the transportation of the Presepio Chapel at Santa Maria Maggiore. Most of the remaining biography recounts, in minute detail, the obelisk's transfer at St. Peter's. Bellori does not waver from Fontana's description:

> When the trumpet gave the signal, at once the capstans turned and the pulleys and levers operated simultaneously: during the first movement it seemed as though the earth were trembling below, and the tower groaned as all the timbers were compressed together by the weight; and the obelisk, which was tilting two *palmi* toward the choir of Saint Peter's, as they discovered by plumbing it, straightened to the vertical.[338]

Bellori's elaboration focuses less on the obelisks and Egyptian antiquities (as one might see in Kircher for instance) and more on the spectacle and its relationship to political machinations. For instance, he recounts the story of how the duke of Luxembourg was sent purposefully into the square during the raising — so that he might get the impression that Sixtus V was using his

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[337] Bellori, "Life of Domenico Fontana"*, Lives*, trans. Alice Sedgwick Wohl, 141. The original passage reads as follows: "*Per la qual cagione abbiamo eletto di scrivere la vita di questo artefice nella memoria di si illustre impresa seguitando per la maggiore parte gli stessi scritti di Domenico, che di tali erezioni e dell'altre sue opere publicò diligentissimi commentarii con le figure, diffondendoci nell'apparato e nella macchinazione, con pensiero che la novità e la grandezza dell'opera debba apportare diletto alla narrazione e gloria all'arte*." Giovan Pietro Bellori, *Le vite de Pittori, scultori, et architetti moderni…* (Rome: Mascardi, 1672), 142.

[338] Bellori, "Life of Domenico Fontana"*, Lives*, trans. Alice Sedgwick Wohl, 145.

powers to "raise Rome itself from the ruins of paganism."[339] There is emphasis throughout his description on the power of machines to aggrandize Sixtus V and his vision for Rome.[340] Bellori asserts the project's status as a technological marvel:

> He was guided through the Porta Angelica beside the Borgo Vaticano; so that the ambassador passed through Piazza San Pietro where, as he seemed to see an army of labourers in a forest of machines and equipment, he halted for two movements of the capstans and said he was gazing in wonder at Rome raised again by the hand of Sixtus.[341]

The effort to narrate the Vatican obelisk project in the century following its completion is encapsulated in the above passage. For Bellori's era, approaching the close of the seventeenth century, the concept of architecture, building site and machine are quite different. A hint of this transformation is evident in Bellori's account. The aforementioned accounts of Fontana's enterprise show the continued attention awarded to the project during the seventeenth century. Artists' biographers Baglione (1642) and Bellori (1672) focused on the figure of Domenico Fontana as architect and inventor. Bellori was more engaged with the elements of technology and power conveyed by Fontana's realization of the project. Athanasius Kircher and Joan Blaeu, fascinated by idea of Rome as a museum filled with curiosities and Egyptian artefacts, reused Fontana's images. Kircher enlisted the account of the obelisk project within his compendium of Egyptian knowledge, whereas Blaeu re-contextualized them in a vision of Rome's urban topography. The latter work was reprinted into the eighteenth century with new editions and

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[339] Ibid, 146. The duke was an ambassador to the King of France, Henry III. Entry was usually made via the Piazza del Popolo, but he was brought through the Porta Angelica.

[340] Alice Sedwick Wohl speculates that the Vatican obelisk project's status as a technological spectacle was one reason that Domenico may have been included over other architects. See the volume's introductory essay, *The Lives of the Modern Painters, Sculptors and Architects: A New Translation and Critical Edition* (2005), 29

[341] Bellori, "Life of Domenico Fontana"*, Lives*, trans. Alice Sedgwick Wohl, 147.

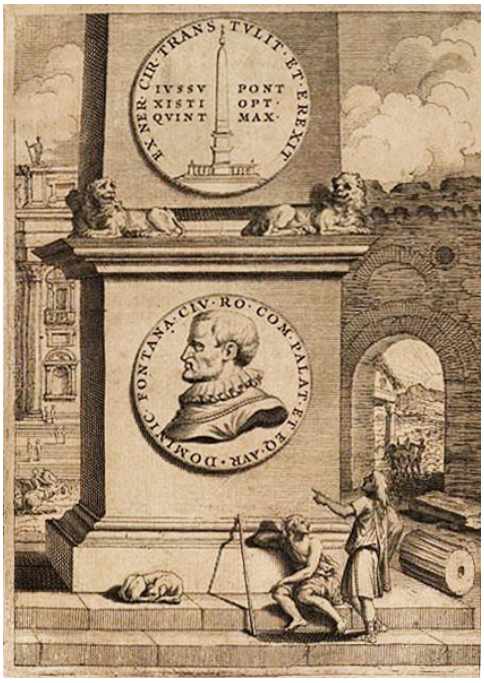

Figure 5.4 Title plate for the Life of Domenico Fontana. Pietro Giovan Bellori. *Le vite de' pittori scultori e architetetti moderni*. Rome: Mascardi, 1672, p. 140.

Figure 5.5 Personification of *Geometria* in Pietro Giovan Bellori, *Le vite de' pittori scultori e architetetti moderni*. Rome: Mascardi, 1672, p. 141.

additional images.[342] But it is Carlo Fontana's treatment of the project that really solidifies the effects of this transformation, as I shall demonstrate in the next section.

CARLO FONTANA'S *TEMPIO VATICANO* (1694)

The most substantial adaptation of images from *Della trasportatione* belong to Carlo Fontana, the descendent of Domenico. He aspired to be chief architect of St. Peter's, and had worked in Bernini's studio during the construction of the colonnade.[343] Carlo Fontana was hired as a researcher by the *Congregazione della Reverenda Fabbrica di San Pietro* to compile documentation on the building's history in an encyclopaedic visual compendium.[344] Accordingly, he devoted an entire chapter of the compendium to the obelisk project, thereby reawakening interest in the work of his ancestor. This section focuses on Carlo Fontana's treatment of Domenico's 1586 Vatican obelisk project, via the transposition of the images into a new body of knowledge. His discourse reveals an understanding of dynamics far removed from the original, more embodied understanding of movement.

In 1694, Carlo Fontana emerged as the preeminent authority on the building history of the Vatican and St. Peter's with the publication of *Tempio Vaticano* (fig. 5.6). The work, with

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[342] Joan Blaeu's work was originally published in three volumes as *Theatrum civitatum et admirandorum* (Amsterdam: Blaeu, 1663). Subsequent versions were published in four volumes in Dutch: *Het nieuw Stedeboek van Italie* (Amsterdam: P. Mortier, 1704); and in French as *Nouveau theatre d'Italie*. Another version was published under the title*, Stedeboek van geheel Italie* (In's Graavenhaage: R.C. Alberts, 1724). I consulted the 1724 edition in the collection of the Canadian Centre for Architecture in Montreal. The fourth volume, *Oud en nieuw Rome* presents Domenico Fontana and the obelisk project.

[343] Nicola Zabaglia reused both Carlo Fontana's and Domenico Fontana's images in *Castelli e ponti* thus sealing them together as one work on construction techniques at the building works of St. Peter's (Rome: Niccolò Marco Pagliarini, 1743).

[344] Carlo Fontana, *Templum Vaticanum Et Ipsius Origo […]/ Il Tempio Vaticano E Sua Origine […]* (Rome: Giovanni Francesco Buagni, 1694).

IL TEMPIO VATICANO
E SUA ORIGINE
Con gl'Edifitii più coſpicui antichi, e moderni fatti dentro, e fuori di Eſſo;
DESCRITTO
DAL CAV. CARLO FONTANA
Miniſtro Deputato del detto famoſo Tempio, & Architetto.
Con molte Regole principali d'Architettura, & Operationi curioſiſſime, date in luce, e delineate dal Medeſimo,
Con un Indice copioſiſſimo delle Coſe più notabili poſto in fine.
OPERA
DIVISA IN SETTE LIBRI,
Tradotta in lingua Latina
DA GIO: GIUS: BONNERVE DE S. ROMAIN.
E DEDICATA
Agli Eminentiſsimi, e Reverendiſsimi Signori
CARDINALI
DELLA SACRA CONGREGATIONE
Della Rev. Fabrica di S. Pietro.
IN ROMA, Nella Stamparia di Gio: Francesco Buagni. MDCXCIV.
CON LICENZA DE' SUPERIORI.

Figure 5.6 Carlo Fontana, *Tempio Vaticano*. Rome: Francesco Buagni, 1694. Italian title page.

Latin and Italian translations appearing in parallel columns throughout the text, set out to allay mounting concerns about the stability of the cupola, completed by Giacomo della Porta in 1590 with modifications to Michelangelo's original design. With this mandate, Carlo Fontana's historical purview is expounded in seven books, chronicling the origins of the site and its earliest buildings, to the contemporary basilica in his day. The first of these examine the Vatican's complex topographical development via reconstructions of Nero's circus, which contextualize both the basilica as well as the placement of the obelisk prior to relocation. The second is a treatment of Constantine's basilica.[345] Book Three focuses on the Vatican obelisk and its transfer from the ancient site to the piazza of St. Peter's basilica. Book Four brings the project into Carlo's time by focusing on Bernini's renovations to the piazza, while Book Five focuses on the church itself and the cupola's construction which are analyzed using Carlo's geometric drawings in order to show its solidity. Book Six juxtaposes the Vatican Temple to the Temple of Solomon as a precedent for monumental scale architecture of infinite spiritual importance. In the final book, he boldly asserts the superiority of the eternal Vatican Temple over canonical monuments including the Pantheon and Santa Maria del Fiore in Florence.

Tempio Vaticano has seventy-nine etched and engraved plates (including one double page and nine folding) drafted by Carlo and engraved by his pupil, the architect Alessandro Specchi. Although there are far too many drawings to be examined in detail here— something can be said about his overall approach to the study of the site and his intentions through the drawings. He used various measured drawings to recreate the details of the construction. They are layered together and outlined in the text. Piece by piece the entire construction comes

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[345] Carlo Fontana (*Tempio Vaticano, Libro II*, 1694) references previously published histories of the of the Constantine basilica including: Giovanni Falda, Tiberio Alfarano and Martino Ferrabosco.

together on its site. One gets a sense of the centuries of history that it encompasses. There is a rigorous attention to measurement, scale and geometry – principles that the author highlights throughout the text. Most importantly, there is evidence of his thorough understanding of Galilean mechanics, allowing him to conceptualize building as a static machine.

Of the seven, I examine the third most closely, which is illustrated with new interpretations of Domenico's plates.[346] This set of images is an ideal lens with which to view the transformations from one century to the next and yet the correlation or difference between versions is often overlooked. The third book in *Tempio Vaticano* "newly described" the obelisk's 1586 transport.[347] Over the course of fifteen chapters, it reconstitutes the story of its movement, but sets it within the history of the basilica and its site. Book three hinges on the presentation of new drawings of the project conceived by Carlo Fontana. Copies of the images from *Della trasportatione* and, by association, the Vatican obelisk project are set into the history of St. Peter's as the model for the temple of Christendom.[348] Carlo's presentation of the obelisk's transport incorporated sixteenth-century accounts by Domenico Fontana, Michele Mercati as well as ancient sources such as Pliny and Ammianus Marcellinus. The discussion concisely reconstructs the method and ingenuity behind the Vatican obelisk's transfer. Very systematically at the opening of the first chapter, Carlo succinctly lists the included figures and what each one is intended to show. In the next, Carlo revisits the origins of the Egyptian obelisks, and how they were brought to Rome. The third chapter looks at the development of the Vatican lands (and

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[346] Carlo Fontana claims that the original engravings were "lost", when in fact, they were purchased by Joan Blaeu in 1663. See D'Onofrio, *Gli obelischi di Roma* (1992), 156-157.

[347] Book Three is entitled, "On the Transport of the Vatican Obelisk and its Erection: Newly Described (*nuovamento descritto*) with Drawings by Cavalier Carlo Fontana, Deputy Minister of the Famous Temple, and Architect". *Tempio Vaticano*, *Libro III*, title page, 107.

[348] Charles B. McClendon, "The History of the Site of St. Peter's Basilica, Rome," *Perspecta* 25 (1989): 32-65.

changes in its topographical elevation). Chapter four accounts for the stone's original placement and the fifth is devoted to the instruments Domenico used for the raising. The remaining chapters (six through fifteen) revisit Domenico's original drawings (showing the obelisk during its movement, the arrangement of the windlasses, the construction of the *castello*, and the machinery). In addition to a brief description of the drawing, each one provides an overview of the drawing's key elements. Carlo does not theorize much about Domenico's project beyond these short, explicatory chapters that measure its contribution. The story is told predominantly through the sequence of images.

Historical interpretations of the engravings inherited from *Della trasportatione* have erred in their qualification of the changes in Carlo Fontana's reappraisal. One commentary, which appears in a catalogue of fifteenth- to seventeenth-century books for the Mark J. Millard Architectural Collection at the National Gallery of Art describes "no substantial difference between the content of these illustrations for the moving of the obelisk and those engraved earlier by Natalie Bonifacio now recut by Alessandro Specchi, but a significant stylistic one."[349] While not an untoward misrepresentation of the projects, (the passage is merely stating an observation about the transfer of the images from one century and audience to the other), its presumptions are telling. The assessment recognizes the diminution of a magical and allegorical dimension of *Della trasportatione* but attributes the difference to a change in pictorial conventions. While this is arguably consistent with a turn from symbolism toward greater precision and accuracy in the seventeenth century, the loss from one to the next is assuredly

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[349] Quoted from Volume IV: *Italian and Spanish Books: Fifteenth through Nineteenth Centuries* (Washington: National Gallery of Art, 2000), 144.

more than stylistic but, rather, substantive and critical. In essence, the content is no longer about an embodied experience of movement at all — its primary concern is mechanics.

Tempio Vaticano also undermines the original sequence of events as presented in *Della trasportatione*. The images from 1590 highlighted the distinct stages that comprised the movement. This process is perceptible in the accompanying illustrations. As one moves through the sequence, there is a transition from the realm of speculation in the very first plate, to the obelisk's final placement aligned with the façade of St. Peter's basilica. The sequence of movement in *Della trasportatione,* as a metaphysical representation of time, is central to the project's textual and visual record. In the first plate, the obelisk is placed in its original site and his model for a superior device wins him the commission; he then arranges and plans the raising and subsequent lowering of the obelisk; the *castello* is assembled and then rebuilt, and finally the obelisk is transferred and re-erected at its new location. Within the pages of *Della trasportatione*, the project moves from the proposal stage, seamlessly through the preparation and coordination, to the event's actualization (see fig. 4.5).

The post-Galilean worldview encompassed a different concept of nature and thus led to a reassessment of the ontological status of movement and motion. Not to be confused with the modern idea of motion as "purely geometrical translation from one point to another", Aristotelian motion is bound to sensorial perception and commonplace experience.[350] A new understanding of natural phenomena dramatically altered the visual study of movement. The appropriated material in the *Tempio Vaticano*, illustrate the lost Aristotelian cosmology and along with it the absence of an embodied sense of movement, place, and time. The fourteen

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[350] Alexandre Koyré, "Galileo and the Scientific Revolution of the Seventeenth Century," in *Metaphysics and Measurement* (London: Chapman & Hall, 1968), 4.

plates Carlo Fontana assembled for this third book are demonstrative of this transformation. Some images from the original project are omitted entirely and those that remain bear little resemblance to the originals beyond the trace of a common stylistic lineage.[351] Further, the intervention of new material and the rearrangement of the event chronology reflect an urgency to reconceptualize the project in operational and quantifiable terms.

To understand the implications of this transformation, consider a 'moment' that appears in both narratives. The original from *Della trasportatione* shows the platform setup in the piazza of St. Peter's (fig. 5.7).[352] It is a moment, or actually several combined in one, depicting a stage in the journey of the obelisk. A description preceding the image narrates this moment as follows:

> Once the *castello* was finished, the needle was pulled underneath it so far that its point emerged outside it on the other side. Then we began to rig it in two or three places, and the blocks were attached to all three exposed sides, as seen in the following drawing. In it, three "needles" are represented standing upright to allow showing in one view the attachments of the blocks on all three of the aforesaid sides.[353]

The narration, laid out as part of the sequence of drawings, gives the impression that several actions are simultaneously unfolding. To the modern reader, the narrative vignettes have the effect of inter-titles in a silent film. The visuals in *Della trasportatione* are devoid of titles (although a legend of parts is provided) while moments flow from one to the next and are narrated and described chronologically. Scenography is expressed in such a way as to give an

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[351] Carlo adapted ten of the original twelve illustrations of the Vatican obelisk project from *Della trasportatione* and then added four new images to the sequence.

[352] Domenico Fontana, *Della trasportatione* (1590), plate 28r.

[353] Domenico Fontana, *Della trasportatione* (1590), fol. 27r; Sullivan, trans. (2002), 36; The description of the drawing appears in the original Italian as follows: *Finito che fu il castello, la guglia vi si tirò sotto tanto inanzi, Che la punta usciva fuori, dall'altra banda, e poi si cominciò ad imbragarla in due, ò in tre luogi, e le traglie si legorno a tutte tre le faccie scoperte, come si vede nel disegno seguente, nel quale si rappresentano tre Guglie in piedi per poter mostrare in una vista l'attaccatura delle traglie in tutte tre le faccie sudette.*

embodied sense of place and time. To return to *Della trasportatione's* treatment of the scene — a triad of obelisks occupy the centre of the composition. Although the action is arrested — the figures of the workers and horses positioned around the winches are in motion. This movement is defined by a delineated circle of motion via the dotted lines etched into the earth (see detail, fig. 5.9). Here and throughout the series of images, the piazza is portrayed not really as a documented site, but rather, as one of the locations the obelisk occupied during its movement. By comparison, *Tempio Vaticano* sets the identical scene in a recognizable setting of seventeenth-century Rome and strips the allusions to physical and sensorial movement (fig. 5.8). Further, the labourers are absent as well as any delineation of a pattern of movement. Ostensibly it shows the same details from *Della trasportatione*: a view of the piazza where the *castello* was re-erected and the arrangement of the blocking on the platform relative to the façades of the obelisk. It rearranges some of the components for greater clarity and precision. The revision provides a topographic setting, removes the experiential aspects of the process and specifically identifies the event with the title "View of the Raised Platform" (compare figs 5.7 and 5.8).

Carlo also changed the vantage point of the scene from the original. Although it has the same orientation (looking westward along the platform towards the director's command post) the triad of obelisks no longer obstruct the view. A strong horizon-line dominates the upward-angled view of the levelled piazza in the 1590 version. In the adapted version from 1694, the piazza is levelled and controlled by the city backdrop. The spacing between obelisks is also enhanced, by virtue of a very clear divide in the spatial depth, to clarify the arrangement of tackle on each obelisk. The foreground features the receding form of the platform; the middle ground provides an unobstructed view of the stark outlines of the obelisk facades; the city dwells in the background. Carlo precisely demarcated the position of the construction site in relation to the

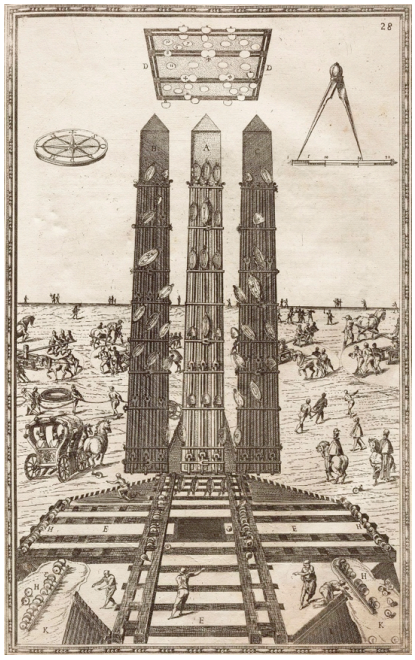

Figure 5.7 Domenico Fontana's view of the apparatus, fol.26r. *Trasportatione dell'Obelisco Vaticano*. Digital facsimile from the copy in the Library of Congress. Oakland: Octavo, 2002.

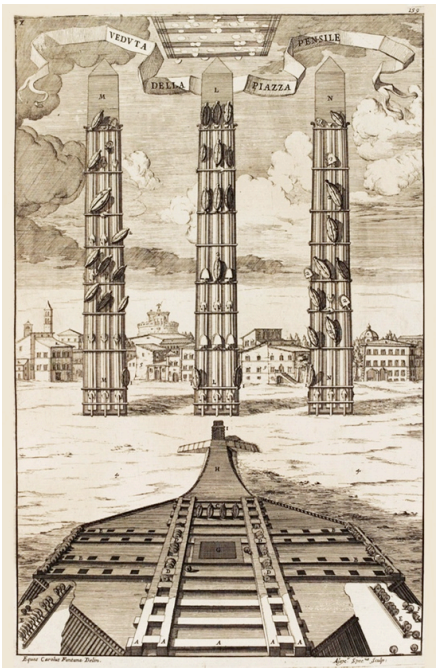

Figure 5.8 Carlo Fontana's view of the raised platform. Carlo Fontana, *Tempio Vaticano*. Rome: Francesco Buagni, 1694, p. 159.

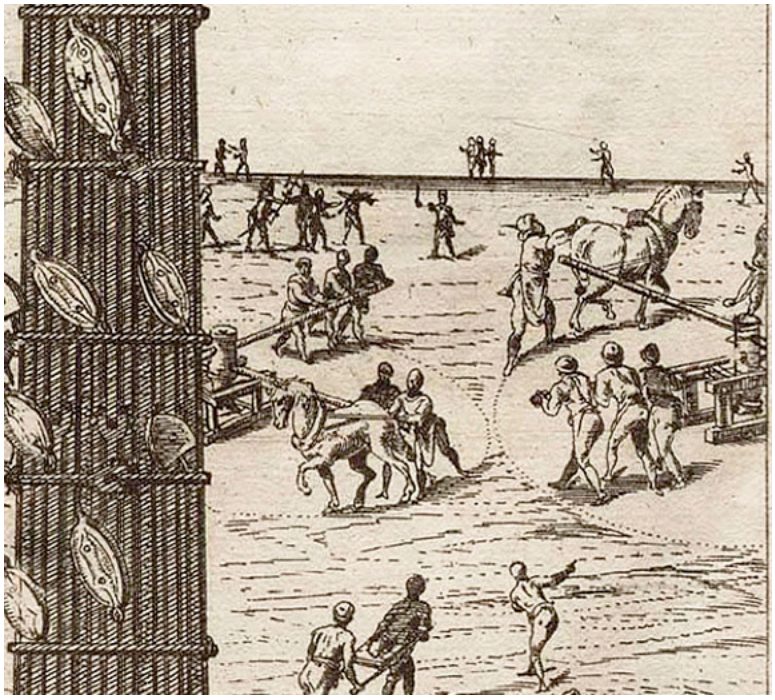

Figure 5.9 Detail showing the movement of the *argani*, *Della trasportatione*, fol. 28r.

city. Unlike the original version in *Della trasportatione*, there is no interaction between the planes of pictorial space and no conveyance of movement.

THE NEW MEASURE OF MOVEMENT

Measurement held a central position in the *Tempio Vaticano*. Rules for quantifying weights, distance and elevation was necessary for understanding the text.[354] Carlo Fontana outlined a system of measurement as a key aspect of architectural knowledge. He says as much in the prefatory remarks of Book One, that with this text, he "hopes to demonstrate fervently, the perpetuity of this great Temple, described in each part using with the most faithful Measures and Rules of Architecture."[355] He further explained what induced him to make the Geometric Drawings for the text, citing that "if they had outlined the parts of the Temple with the Rules of Perspective, they would not have been able to find the exact measurements, as much for the extraneous things, as for the whole."[356] Another dimension brought forward, I argue, is how Carlo Fontana's promotion of measurement and geometry in the *Tempio Vaticano* demonstrated a new understanding of the machine and thus reconfigured the picture of movement.

As a by-product of the new science, the impetus to render things visible, to categorize and to measure, characterized early modern printed images in the technical arts and

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[354] Giovanna Curcio argues that Carlo Fontana expressed the necessity of literacy in mensuration in order to encourage the right values in his students – Carlo intended that St. Peter's be used as a monumental machine/model for teaching. See "*La misura nella Fabriche Magnifiche*: Carlo Fontana, Alberti, Bernini," in *Tempio Vaticano*, 1694, Curcio, ed. (Electa, 2004), LXXI.

[355] My translation. *Tempio Vaticano,* Libro I, Cap. III, 6. This oft-quoted passage reads: *sperando con vive dimostrazioni additare la perpetuità di questo grandissimo Tempio delineato da Noi con fidelissime Misure e Regole d'Architettura in ogni parte*.

[356] My translation. See *Tempio Vaticano, Libro I, Cap. III*: "*Se si fossero delineate le parti del Tempio con le regola della Prospettiva, non si sarebbero potute trovate le precise misure, tanto per le cose superfiziali, quanto per le corporee*".

architecture.[357] Mensuration emerges early-on as a central theme in the *Tempio Vaticano* and directly impacts Carlo's Fontana's description of the site and the Vatican obelisk's translocation. A promotion of both systems of measure and geometry are the foundations of Book One, as he initiates the delineation of the form of the ancient basilica on its site.[358] The fourth chapter of Book One, entitled, "On the Diverse Measures Belonging to the Learned Architect", enumerates the most celebrated authorities on mensuration. Discussions of ancient systems of measurement follow and are compared to 'modern' seventeenth-century values.[359]

The obelisk acts as a marker in the text — a surveying tool for assessing the site's long history. It appears in nearly every map, plan and sectional Chapter 5. Carlo Fontana juxtaposes ancient Roman measures with the "Modern Measures of the Architect." – either its footprint or vertical profile. *Tempio Vaticano*, in the wake of Guarino Guarini's *Modo di misurare le fabbriche* (Turin, 1674) is a key example of the seventeenth-century development of practices of surveying and levelling.[360] One view documented in *Tempio Vaticano* (not in the original series by Domenico) illustrates the alteration of the topography and measures the distance of the obelisk's transportation in terms of lateral distance and elevation change. The etching entitled,

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[357] Mario Carpo has distinguished between the vague notion of "precision" that was set out by Alexandre Koyré and how this translated into the use of numbers in early modern architectural drawings and treatises on the orders. A key distinction that emerges is the difference between the precision afforded by geometry and the later need to take on-site measurements. See Carpo, "Drawing with Numbers: Geometry and Numeracy in Early Modern Architectural Design" in *JSAH* 62, no. 4 (Dec. 2003): 448-69.

[358] A major concern in Book One of the *Tempio Vaticano* is the discussion of mensuration. See *Tempio Vaticano, Delle Cose più notabili seguite in tempo della Potenza Romana nel Vaticano*, Libro I, (1694).

[359] He compares the discussion of the use of the foot by Vincenzo Scamozzi. Other sources he mentions include Varrone, Boethius and Herodotus. In the fifth chapter Carlo Fontana juxtaposes ancient Roman measures with the "Modern Measures of the Architect." *Tempio Vaticano, Libro V.*

[360] Alberto Pérez-Gómez, *Architecture and the Crisis of Modern Science*, (Cambridge, MA: MIT Press, 1983), 94.

"Section that Verifies the Soil Accretion of the Vatican Sites", delineates the obelisk's ancient position in elevation compared to its raised placement after the transfer (fig. 5.10). The drawing fits the iconography of the book as whole showing the elaborate layers of building history and marking the obelisk's location relative to the Vatican hill. It also demonstrated that the ground plane of the new temple is significantly higher than it had been in antiquity.

The obelisk became an archaeological marker for these substrata of history and an orientation device for locating origins. The scale of the drawing shows Roman palms. An elevation of the *guglia* at its 1694 location stands on the left of the section. On the right (marked E), the lower position of the obelisk is shown sunken below ground partway up the shaft. Its ancient base (marked F) also marks the foundation of its position at the centre of Nero's circus (*spina*). This lowest zone is the datum of the ground plane, represented with a line marked A, prior to the raising of the city. Prior to the transportation, this base had been covered in earth. On the far right, is an elevation of one of the cupola's supporting piers. The drawing documents a succession of levels of the fabric of Saint Peter and the corresponding level of the earth and water level (B). The level of the main basilica is marked D (30 palms above the position of the obelisk).

The emphasis on verifying and documenting the building with precision and the use of geometry does not correlate with the Vatican obelisk project's original presentation in *Della trasportatione*. No drawings in *Della trasportatione* work document the project in this manner, as this is done through the narrative, rather than through precise measurements of the site and the existing built-form. Domenico Fontana described the original site adjacent to the sacristy as a crammed space, forgotten over time — an impression that is conveyed in Guerra and Bonifacio's engraving of the raising. In contrast, Carlo Fontana marks the obelisk's transformation by a study

of its details and architectural components. A plan (and an iconic one from the text) layers the foundations of the New Temple, the Circus of Nero, and Constantine's Basilica in 200-palm scale. It marks out the ancient siting of the obelisk (marked on the plan as number 187) and makes the distance traversed part of the built evidence of the church (fig 5.11).

In Domenico's project, measurements are provided anecdotally or in haphazard ways. In *Tempio* Vaticano, precise details are presented in a drawing entitled the "Measurements of the Vatican Obelisk and Pedestal" (fig. 5.12).[361] It shows the profile of the obelisk's foundation and pedestal and measures the height and proportions of its components including the base, dado, coping and cornice. It documented the obelisk in its present site: as focal point of the piazza with a visual connection to the porticoes. This is done via a section on the cartouche in the centre of the page. This table also provided measurements of the obelisk (it is shown in frontal elevation and in perspective. Once again this gives the presence of these elements in the piazza the authority of being parts of the greater whole. All aspects having been carefully planned as integral parts of the modern building site of St. Peter's basilica and the Vatican grounds.

A new paradigm of precision in measurement has taken hold here and a greater degree of verisimilitude in representation. Carlo Fontana had applied rigorous attention to the accuracy of the picture of the site's history. This new emphasis, demonstrated in the approach to the delineation and demarcation of St. Peter's – means that the delineation or visual description of the process of movement has been altered too. We can look at the changes not only in the field of

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[361] The drawing of the Measurements of the Obelisk and Pedestal is from *Tempio Vaticano*, Libro III, Cap XV, 169. (*"Misure dell'Obelisco Vaticano Et Piedestallo"*).

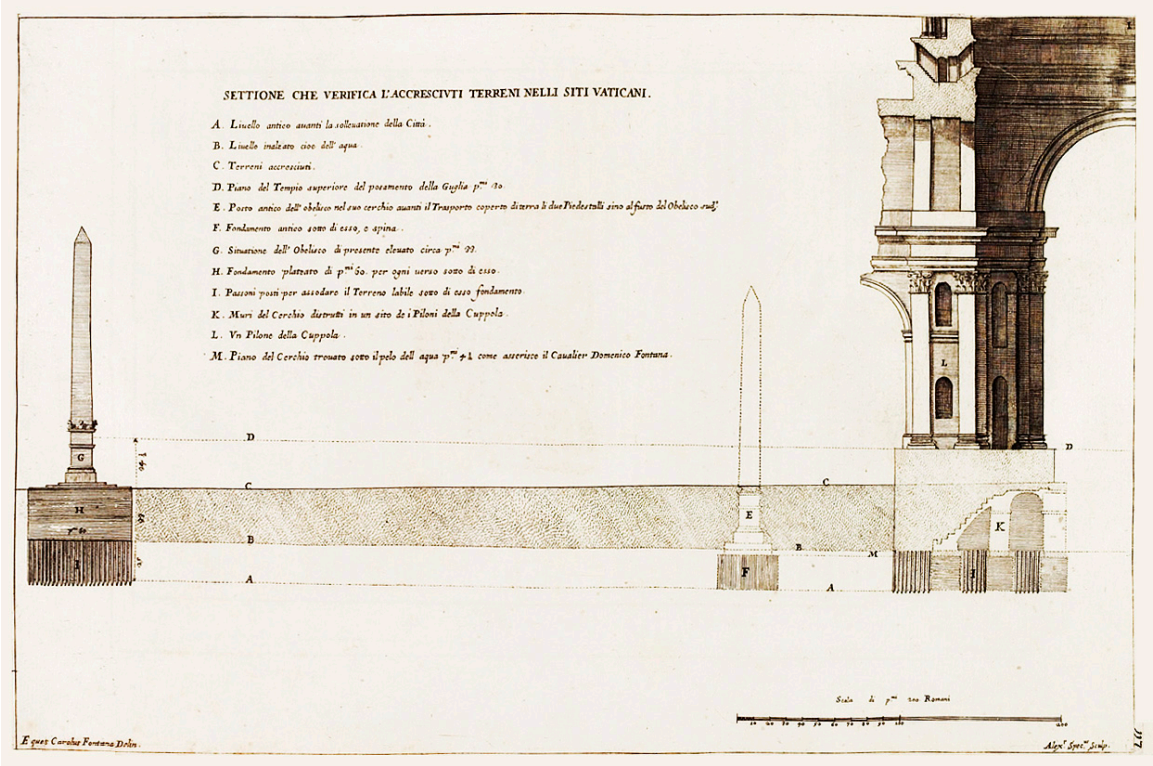

Figure 5.10 Section showing the obelisk's position. Carlo Fontana, *Tempio Vaticano*. Rome: Francesco Buagni, 1694, p.117.

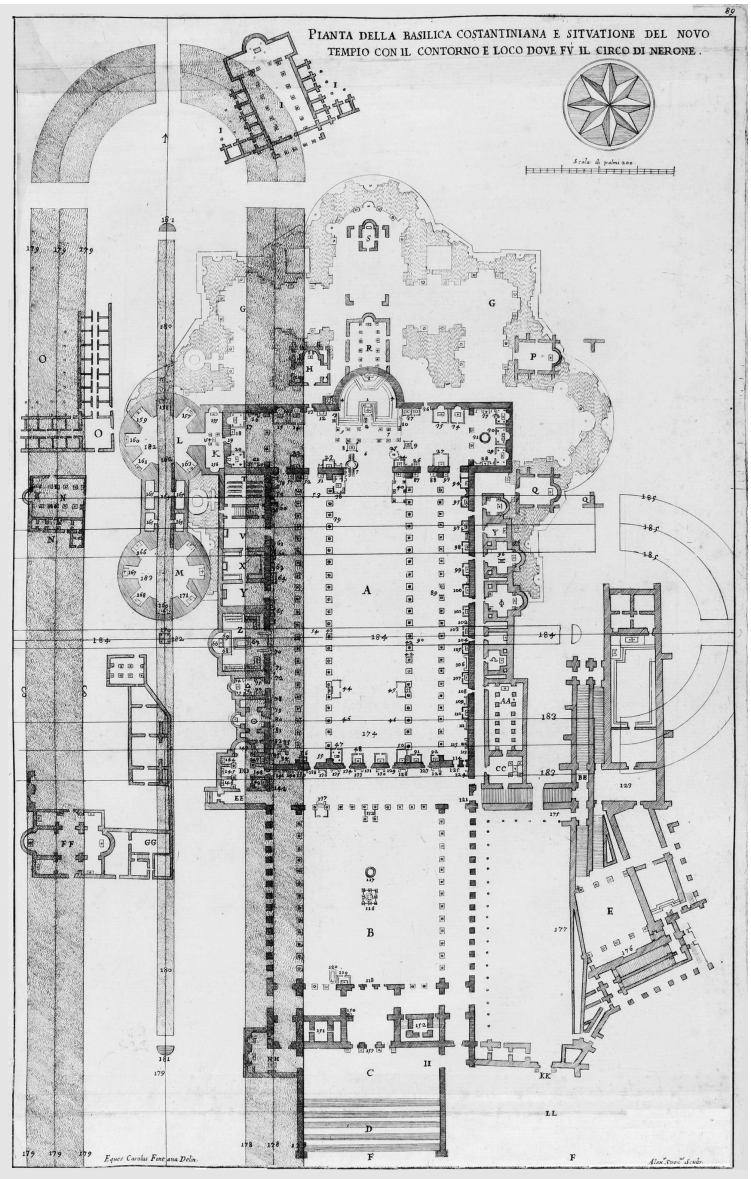

Figure 5.11 Plan of the site of the basilica of St. Peter's. Carlo Fontana, *Tempio Vaticano.* Rome: Francesco Buagni, 1694, p.89.

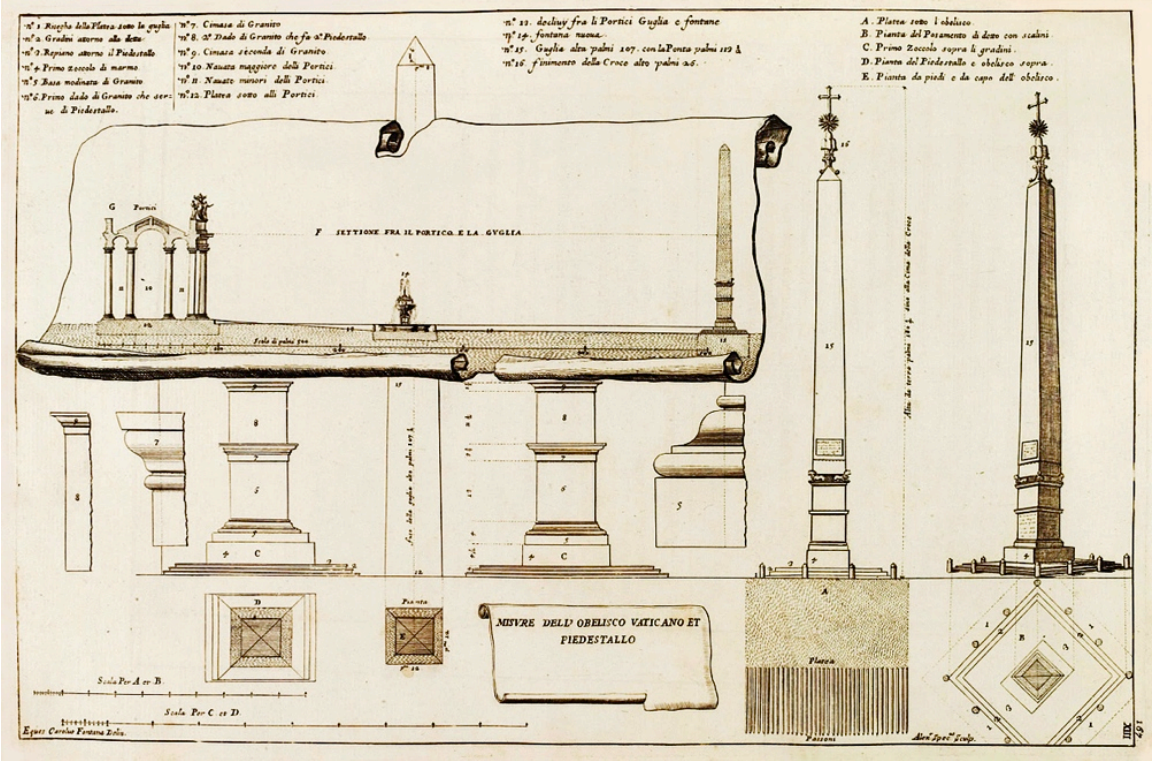

Figure 5.12 Measurements of the Pedestal and the Obelisk. Carlo Fontana, *Tempio Vaticano.* Rome: Francesco Buagni, 1694, p.167.

architecture, geometry and civil engineering, to see these effects on the representation of movement, but they are also felt in other arenas.

THE MACHINE OF ST. PETER'S

The concept of the machine as a model for the universe and of movement (in its capacity to reveal and conceal knowledge) was promulgated in the fifteenth and sixteenth century technical treatises of Alberti, Barbaro, Pigafetta, Agrippa and Fontana to name a few. Vincenzo Scamozzi revived the Vitruvian concept of *machina*:

> The Art of Machines is that of the Mechanic, namely of the ingenious and active man, which is subject to the command of the Architect. In Machine and Instruments you ought to consider mainly the Motor, or its Agent, the motion or the effect that the Machine and Instrument make, the object's movement created by the Machine, the form and the material of which it is composed, the time in which it moves, and the place where it has moved and is transported, and other things dependent on these.[362]

In the post-Galilean intellectual climate at the close of the seventeenth century, the term *machina* would come to mean something quite different. Carlo Fontana's use of "*Machina,*" in 1694, refers specifically to the construction site as part of the greater complex of St. Peter's.[363] Since Scamozzi is cited in *Tempio Vaticano*, it is worth examining whether he also adopts his

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[362] My translation. Scamozzi's definition of *machina* is quoted from the Glossary in *Della trasportatione* (Milan: Polifilo, 1977) LXXXVII. The passage reads as follows: "*L'Arte delle Machine è propria del Mechanico, cioè dell'huomo ingegnoso et attivo, il quale soggiace al comando dell'Architetto (...) Nelle Machine e ne' Stromenti si deono considerare principalmente il Motore, o sia Agente; il moto o sia l'effetto che fa la Machina e Stromento; la cosa mossa, per la quale si fa essa Machina; così la forma di essa, e la materia di che ella è composta; il tempo nel quale essa si move, et il luogo di dove ella è mossa e si trasporta, et altre cose dipendenti da queste."* The term appeared in many of the technical treatises of the fifteenth and sixteenth centuries and appears in the works of Alberti, Barbaro, Pigafetta, Agrippa and Fontana — to name but a few. Scamozzi's description of *machina* appears in *L'Idea* (1605), 362-4.

[363] See Giovanna Curcio, "Del Trasporto dell'Obelisco Vaticano, e sua Erezione" in *Tempio Vaticano 1694* (2004), CLXX.

Vitruvian definition of *machina*. Carlo Fontana's invocation of the *fabbrica* of St. Peter's encompasses the materials, the labourers, scaffolding, the studios, manufactories, and site (or *cantiere*) as parts of site of experimentation. This is expressed in the preface of *Tempio Vaticano*, describing its motivations:

> (…) to reveal to the universe the stability and firmness of the entire Vatican Site, and this work that was undertaken, which is revealed to those who have never seen it nor observed the quality of said temple, in its artifice and the ingenious and stable construction of such a large and portentous *Machina*.[364]

Many scholars have looked at what this definition of "*machina*" entails. Dorothy Metzer Habel also describes the project of St. Peter's in the seventeenth century in these same terms — as "*una macchina così grande*".[365]

Della trasportatione's cosmological view of "concordance" in showing the coordination of the building site, are transformed in *Tempio Vaticano* into a dramatic aerial perspective of the building operations activity (figs. 5.13 and 5.14). Whereas his predecessor's views bear close resemblance to Ptolemaic diagrams of the cosmos, Carlo Fontana's visualization of the *fabbrica* clearly favours the breadth and spectacle of operations. Individual figures, including those of the spectators, workers, and dignitaries, are also overpowered by the vast scale of the piazza and of the buildings in the distance. Carlo's drawing also provides more detail and context, but seems quite detached from its environs. The reference to Domenico's original plan drawings of the

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[364] This is an oft-quoted passage from Carlo Fontana's text*: (...) ma per palesare all'Universo la stabilità, e fermezza di tutta la Mole Vaticana, e fu intrapresa la presente Opera, nella quale si palesa a chi non ha mai veduto, né osservato la qualità di detto Tempio, quano sia stato l'artifizio, e l'ingegnosa, e stabile construttione di così grande, e portentosa Machina*. : See Carlo Fontana, *Tempio Vaticano* (1694), *Proemiale,* Libro I, Cap. I, 2.

[365] Habel, *The Urban Development of Rome in the Age of Alexander VII* (Cambridge, UK: Cambridge University Press, 2002), 282-5.

platform and causeway are evident. It also provides a view from a high vantage point — as if one is looking down from St. Peter's.

Carlo presented the machines and instruments used to transport and erect the obelisk in a format refined for the 1690s. These tools are portrayed with greater verisimilitude, are neatly arranged and labeled, and partitioned into distinct views (fig. 5.15). The impetus of this presentation, according to the text, is to ensure that these components might be legible, and in order to provide knowledge of their operation and effects, their composition of materials, and how they can be manufactured. Carlo identifies the *argano* as the primary instrument, which is delineated in measured plan, elevation and perspective views.[366] In *Tempio Vaticano,* as compared with the presentation of instruments in *Della trasportatione*, (see fig. 4.4 in the previous chapter), there is a didactic motive for the representation of tools. In contrast, sixteenth-century literature on the Vatican obelisk project expressed the harmonious movement of the *argani* (windlasses) as Domenico Fontana's embodiment of the role of *conduttore.* Giovanna Curcio has argued that Carlo Fontana underscores those technical details of the obelisk's transport that can be used to "emphasize general principles" that would be useful to the architect.[367] Therefore, the new rendition of the Vatican obelisk project, dramatically removes the instruments from the specific context of St. Peter's, whereby they are detached from their original site connected to the sacristy, but are rather shown as being part of the "workshop" of St. Peter's. In Carlo's representation of the project, he is not telling the story of a specific moment

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[366] Carlo Fontana, "*Degli'Istromenti, che servirono per il trasporto dell'Obelisco," Tempio Vaticano*, Libro III, Cap. V, 125.

[367] Giovanna Curcio, "*Del trasporto dell'obelisco Vaticano e sua erezione*," in *Carlo Fontana: Il Tempio Vaticano 1694*, ed. Giovanna Curcio (Milan: Electa, 2003), 180.

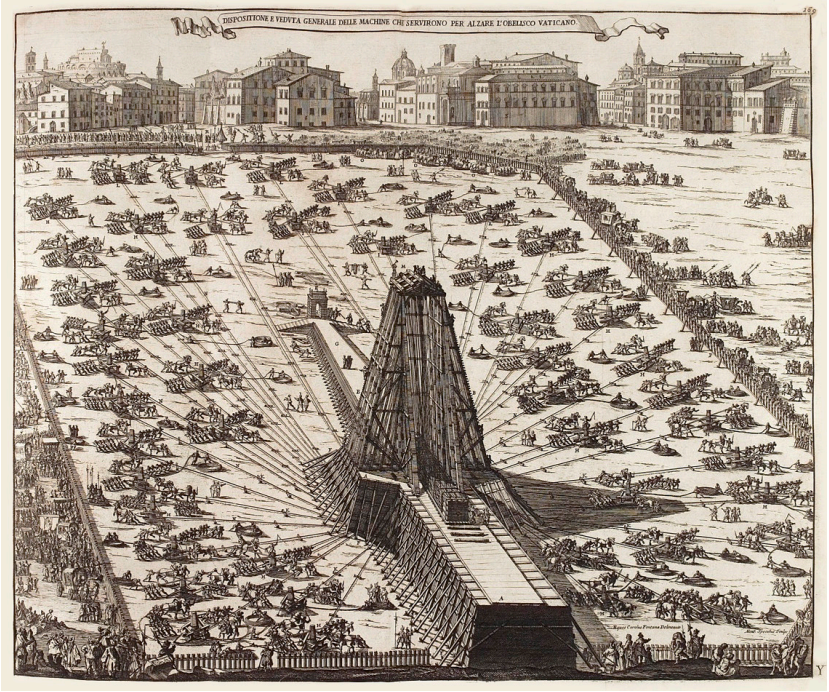

Figure 5.13 View of the Machine of St. Peter's. Carlo Fontana, *Tempio Vaticano.* Rome: Francesco Buagni, 1694, p.159.

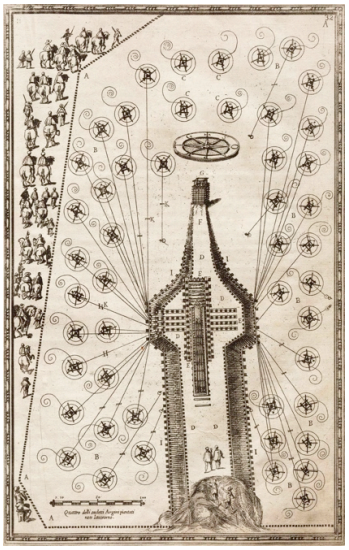

Figure 5.14 Domenico Fontana's plan of the obelisk's raising, fol. 32r. *Della Trasportatione dell'Obelisco Vaticano*. Digital facsimile from the copy in the Library of Congress. Oakland: Octavo, 2002.

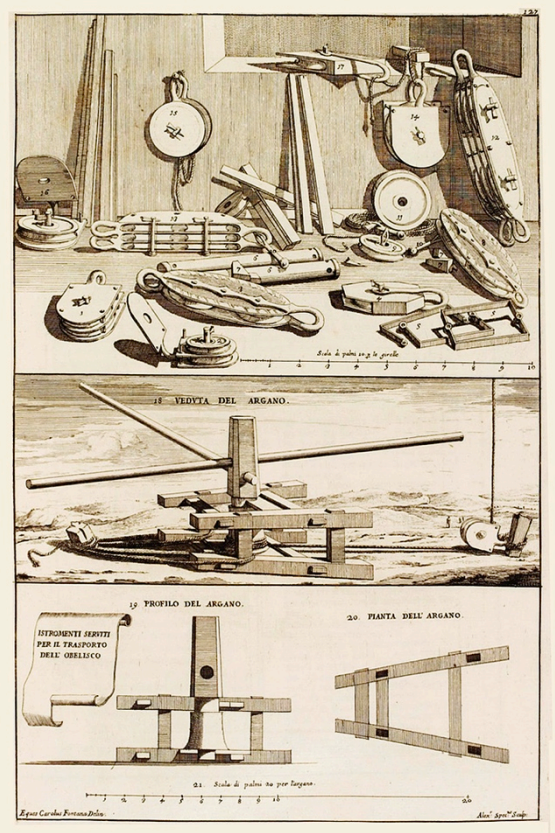

Figure 5.15 The tools and instruments used to raise the obelisk. Carlo Fontana, *Tempio Vaticano*. Rome: Francesco Buagni, 1694, p.127.

and time, but using the obelisk project as a model to demonstrate principles that can be applied to the practice of the architect.

Carlo Fontana's rendition, I would add, is a visualization of the new concept of movement. After Galileo authored *De motu* in 1592, motion is no longer understood as a process but a state.[368] Carlo's reconfiguration of Domenico Fontana's illustrations conveys the understanding of motion as an experimental concept, and the impact that this transformation would have on the understanding of the machine and its relationship to architecture. Furthermore, the metaphysical presence of movement found in Domenico Fontana's project, has all but disappeared.

THE LEGACY OF THE VATICAN OBELISK PROJECT

Domenico Fontana committed his legacy in writing, via *Della trasportatione*, for the benefit of future generations of architects and those interested in his method for moving obelisks. The drawings from the original text images were further disseminated in the eighteenth century, in Nicola Zabaglia's *Castelli e ponti* (1743).[369] The text presented designs for scaffolds and apparatus for the *fabbrica* at St. Peter's alongside illustrations from both Domenico and Carlo Fontana, directing focus away from the themes of movement and onto Domenico Fontana's scheme as a progenitor for Zabaglia's inventions. In the dissolution of the metaphysical qualities of the obelisk's movement, that had dominated sixteenth-century interpretations of the project, this book proposed a new encyclopaedic vision of the Vatican Obelisk project in anticipation of

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[368] Paolo Rossi, *The Birth of Modern Science*, trans. Cynthia De Nardi Ipsen (Oxford: Blackwell, 2000), 88.

[369] Zabaglia's inventions, developed from the original *castelli* used by Domenico Fontana, were used for many building and restoration projects at St. Peter's.

the advancements in statics to the germinating discipline of "building science".[370] Zabaglia's inventions, developed from the original *castelli* used by Domenico Fontana, were used for many building and restoration projects at St. Peter's.[371] The *castello* proposed by Domenico Fontana was the command post from which his reenactment of creation and cosmological movement could be ordered. But for the true origins of this concept we must include Camillo Agrippa's device, which employed a wooden tower construction, with a pyramidal profile and cruciform plan, and that like Domenico Fontana's, was a machine that functioned as a microcosm for the universe.

Perhaps the most significant shift in Domenico Fontana's project was the role that he himself played as the coordinator. I opened this thesis with a retelling of Fontana's narrative of the preparations for the Vatican obelisk's lowering before its translocation. In the original account, Fontana evocatively described the sensation of the earth moving, and the machine reverberating.[372] In 1885, Henry H. Gorringe published a work on modern methods of obelisk transportation. It is ostensibly a comparison of the techniques that had been applied to transport and erect the New York obelisk, the Luxor in Paris, and the obelisk at the piazza of St. Peter's. Lieutenant Seaton Shroeder, of the United States Navy, appraises Fontana's feat as follows:

> The architect then assumed a conspicuous position whence he could be seen by all, and speaking in a loud voice, recalled the religious motives that prompted the transplantation

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[370] Nicoletta Marconi, "Nicola Zabaglia and the School of Practical Mechanics of the Fabbrica of St. Peter's in Rome"*, Nexus Network Journal* 11 (2009): 183-200. Also see Angela Marino, "Sapere e saper fare a Roma, ai tempi di Zabaglia." *Sapere e Saper Fare nella Fabrica di San Pietro: Castelli e ponti di maestro Niccolo Zabaglia 1743.* Rome: Gangemi Editore, 2008. 12-53.

[371] They well-made constructions that purportedly they were still in widespread use until the twentieth century when they were replaced with metal scaffolds. See Marconi, (2009), 186.

[372] This moment was during the lowering phase of the project. See Fontana, *Della trasportatione* (1590), fol. 14r.

> of the obelisk. "The work that we are about to undertake is in the cause of religion and for the exaltation of the holy cross. Implore with me the help of God, the sovereign moving power; let us ask for His help, without which all of our efforts must be in vain." And all within hearing – noblemen, citizens, priests, strangers – fell on their knees and recited a *pater* and an *ave*. A striking scene it must have been, and typical of that curious age."[373]

Furthermore, the accompanying diagram, derived from the *Tempio Vaticano* engravings, analyzes the apparatus rather than conveying any sense of the event (fig. 5.16). Shroeder describes the "transplantation of the obelisk," and how it is moved from point A to point B (as it is dragged on rollers across the causeway).

Such a view of Domenico Fontana's legacy on St. Peter's and on the practice of architecture detaches it from the concept of "transportation" and movement that he espoused. The preceding chapters have strongly emphasized the moment of Domenico Fontana's project (both the event and its version in the book) for how they were situated at this moment on the cusp of the new cosmological picture, and the formation of mechanics as a discipline to be applied in the now distinct fields of architecture and engineering. The key to unraveling this picture has been the texts on the obelisk's movement and transportation, by Fontana and his contemporaries, and then in the final chapter, its afterimage, and how they connote an idea of movement traced throughout this literature.

Recent studies on the Vatican obelisk project —whether from the point of view of Domenico Fontana studies, Sixtine urbanism, or the history of engineering and technology — have acknowledged the issues that concern my own research, but in a piecemeal way. My intention was to create a work that would bring these threads together in hopes of revitalizing the

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[373] Lieutenant Seaton Schroeder, "Chapter V: Re-Erection of the Vatican Obelisk" in Henry H. Gorringe, *Egyptian Obelisks* (London: John C. Nimmo, 1885) 110-118.

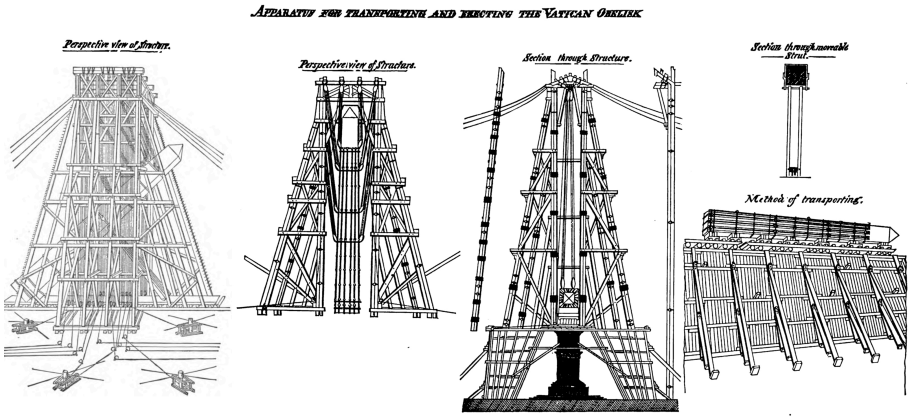

Figure 5.16 The ‘apparatus’ for moving the Vatican obelisk according to Henry H. Gorringe, *Egyptian Obelisks*. New York: H.H. Gorringe, 1885, pl. XXXVIII.

importance of Fontana's enterprise as an architectural act. The story of transporting obelisks intersects with the story of machines and mechanics. In the end, the implications for architecture have to do with Fontana's role as the *conduttore* and the event as reenactment of the creation of the cosmos. The project conjured this view of the universe and the architect's role as creator.

Even reassessments of the project fall back on this interpretation based on Fontana's reputation for pragmatism, particularly if there is not a wider contextualization of Fontana's intentions. There is more potential, I contend, to investigate Fontana's project as a key moment in the ontology of movement. The sixteenth-century concept of machine and its relationship to movement and mechanics are implicated in the sixteenth-century concept of transportation, particularly as a practice related to architecture. As Gorringe's work attests, it is compelling to find analogies for these events within our contemporary context. Its assessment as a technological spectacle or a modern celebration of the machine, however, belies its actual meaning. The aim here has been to unpack the notion of transportation as it was used throughout this literature and how Domenico Fontana and his milieu envisioned movement, machines and the role of the architect.

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