

The Santini Codex

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Codice Santini (1480-1530 ca.)

A remarkable manuscript on vellum, encompassing the summa of the Renaissance knowledge of Urbino, intricately illustrated at the courts of the Montefeltro and Della Rovere families. Its primary objective was to exalt their supremacy in both civil and military machinery.

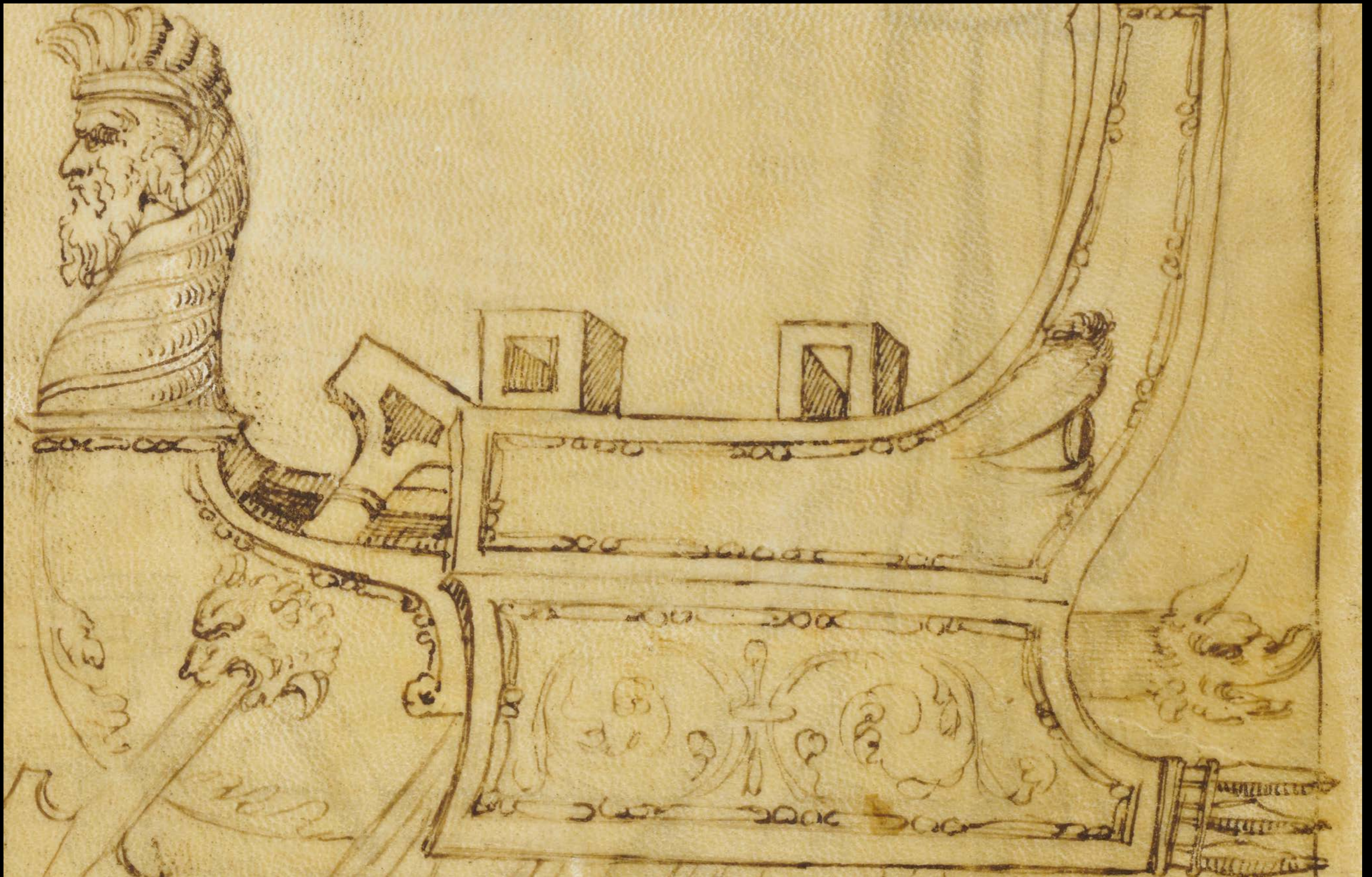
The authorship of the *Santini Codex* remains uncertain, though it undeniably aligns with the cohort of individuals closely associated with Francesco di Giorgio Martini (1439-1501). Scholar Gustina Scaglia posits it as a preparatory work for the renowned panels constituting the Fregio dell'Arte della Guerra, originated around 1475 for Duke Federico da Montefeltro (1422-1482). Contrary views, championed by scholars like Marcella Peruzzi, suggest an execution timeframe of approximately 1525-30 by Giovanni Battista Comandino, who purportedly copied it from Francesco di Giorgio Martini's *Opusculum de Architectura*. A more recent analysis by Professor Pietro C. Marani, President of the Ente Raccolta Vinciana of Milan, places its creation in the early years of the Sixteenth century.

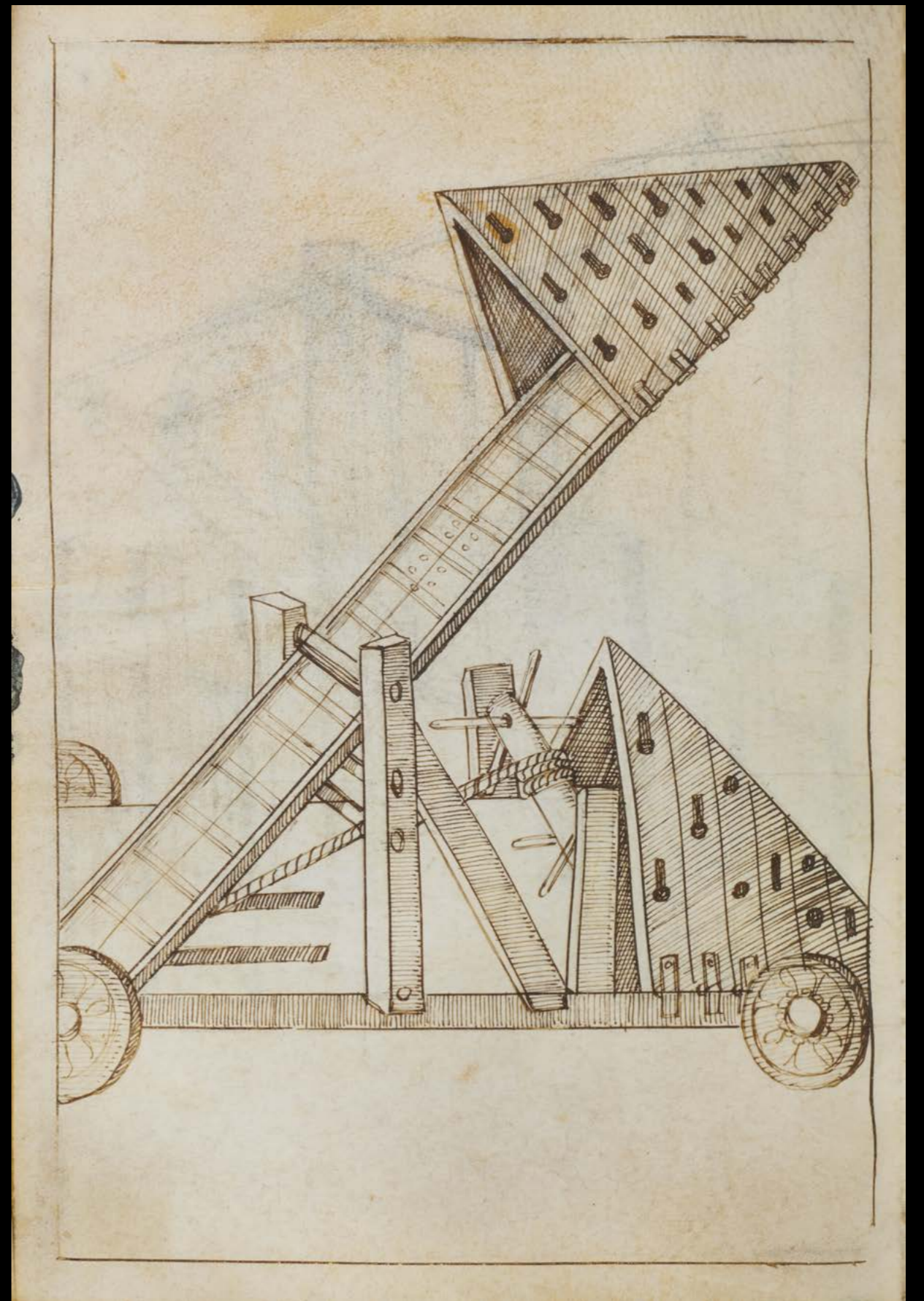
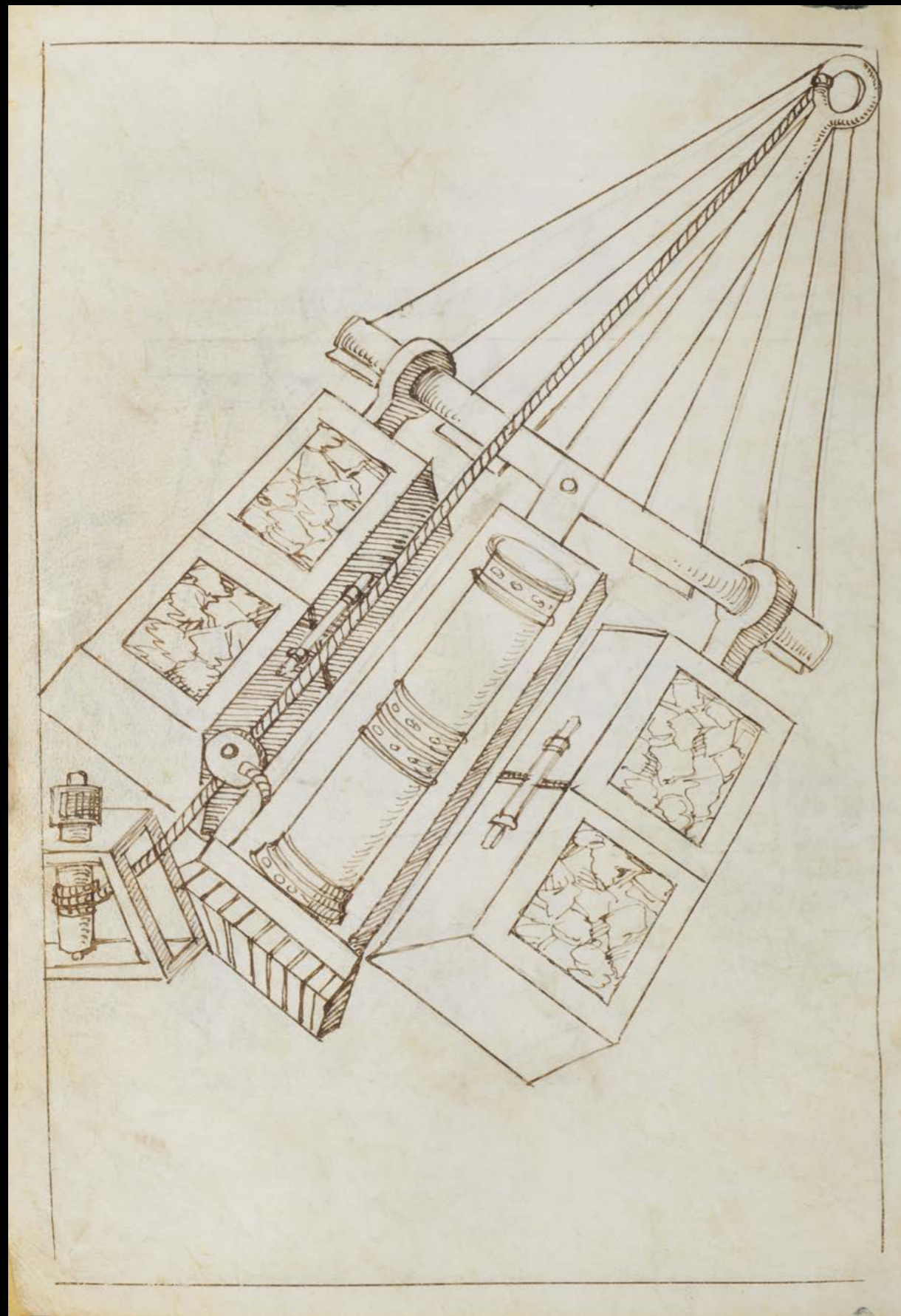
On August 6, 2012, under protocol 12340, the Ministry for Cultural Heritage and Activities received communication from the Regional Directorate for Cultural and Landscape Heritage of Emilia Romagna, declaring the manuscript as cultural heritage in accordance with art. 15 c. 1 of Legislative Decree 42/2004. The lot is therefore restricted from leaving Italian territory.

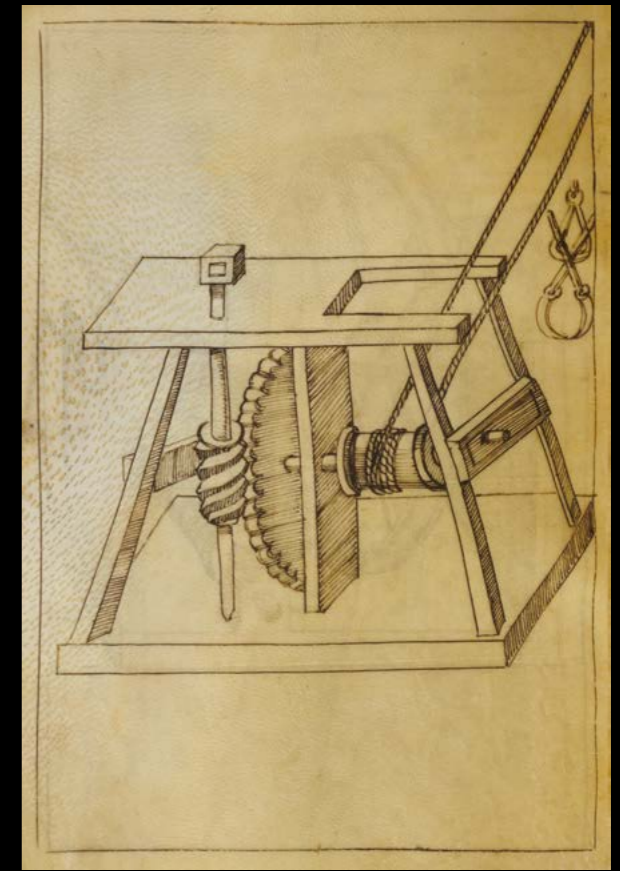
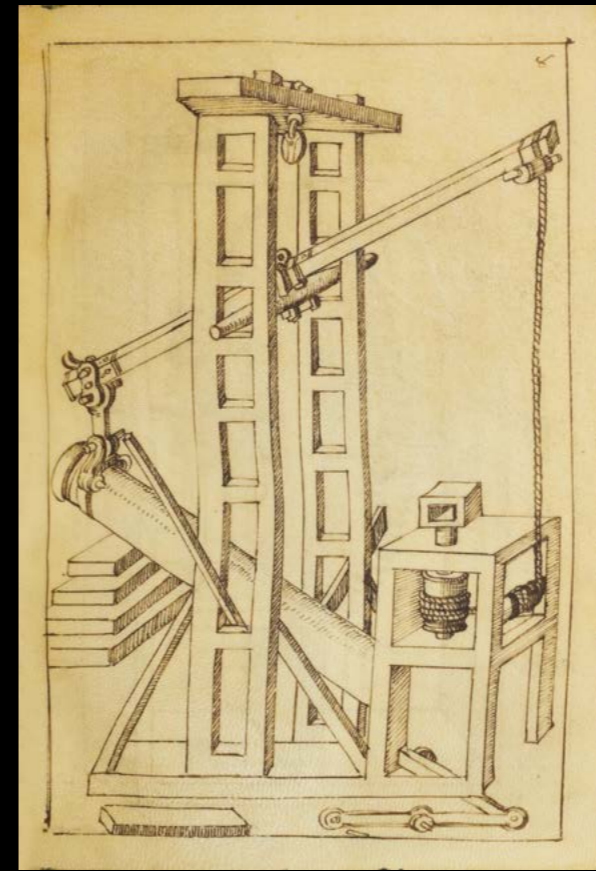
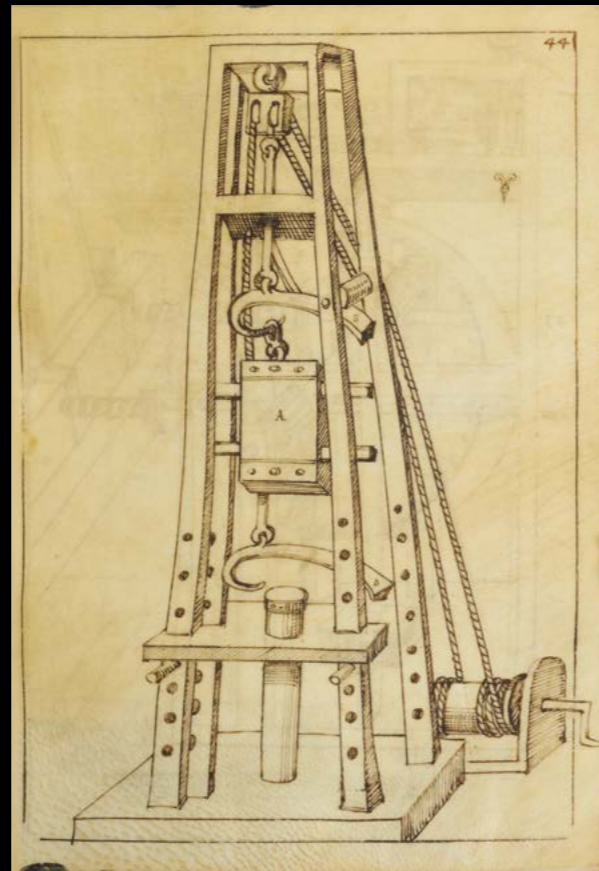
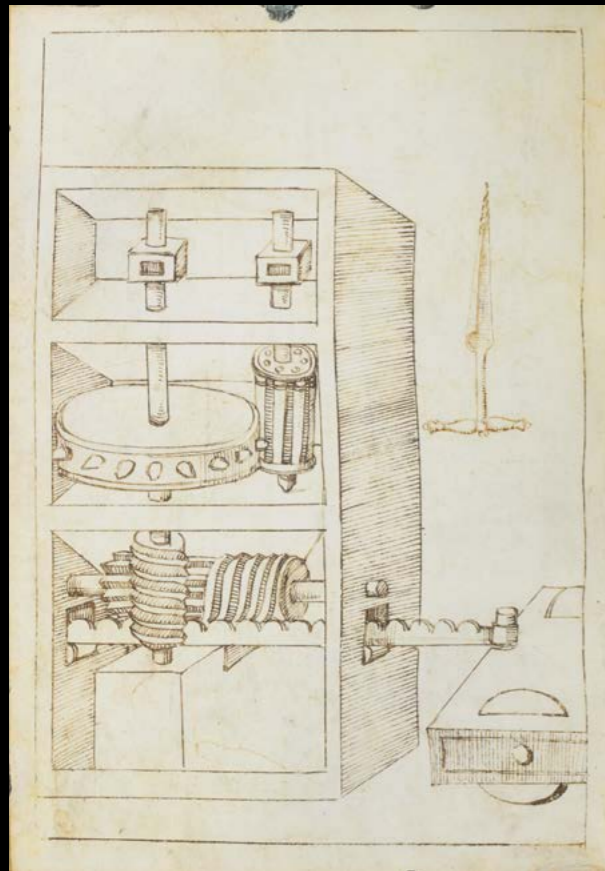
For additional details, please refer to the accompanying cataloguing.

€ 380,000 - 450,000





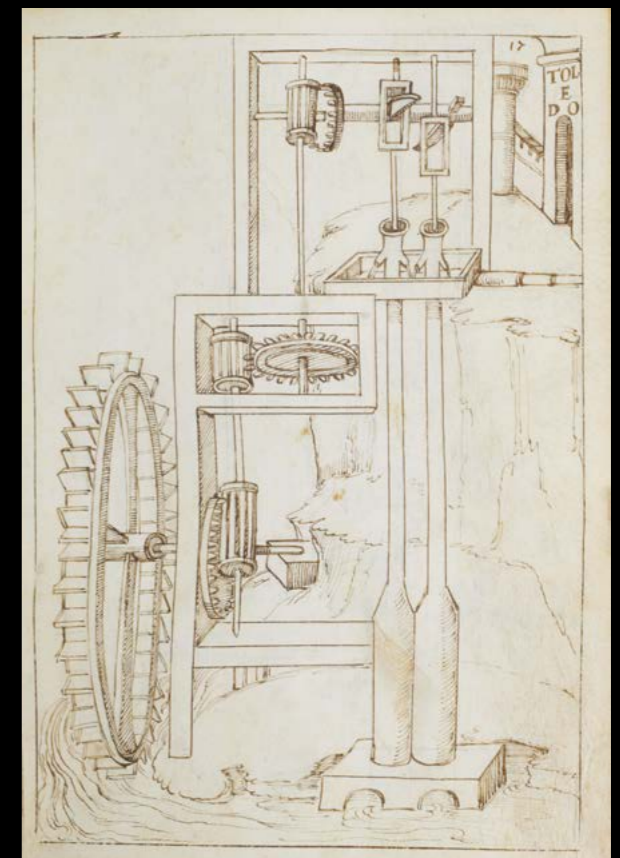
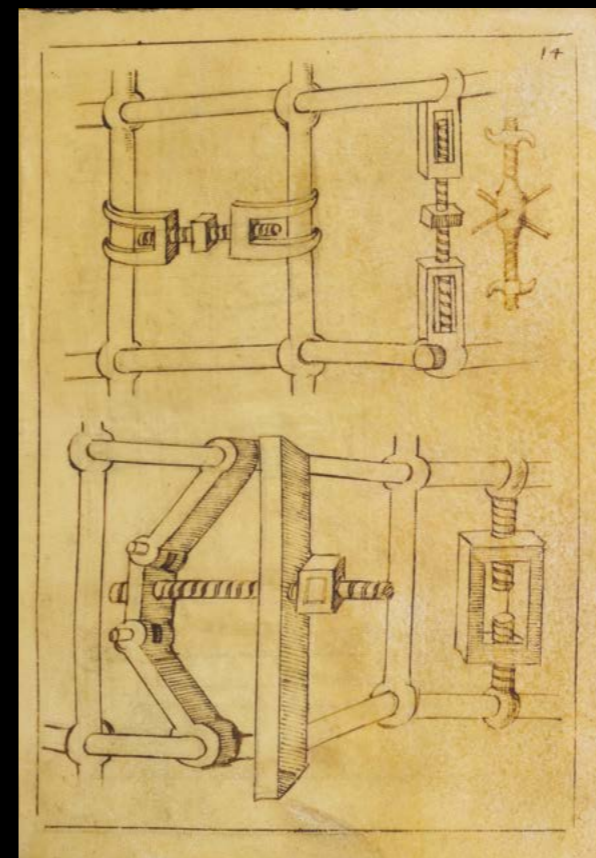




COMPOSITION

Manuscript on high-quality and thick vellum, well-polished with marked chromatic differences between the flesh side and the fur side (dimensions 211x151mm). 68 leaves numbered by an early hand from 1 to 66, with 2 unnumbered leaves following 5 and 66. The sheets are framed, preceded and followed by two blanks. The drawings are on 136 pages and depict machines primarily for civil use, and a few designed for military purposes. There is no title, nor is there any written text except for the word "TOLEDO" on c.17r and a letter "A" featured in a pile-driving machine; there are also no decorative elements such as trees, animals, or people, which sometimes appear in similar codexes. In some leaves, there is a faintly sketched landscape, serving to better illustrate the functioning of certain machines. The machines are represented in pseudo-axonometry, ensuring greater precision in depicting mechanisms compared to the converging perspective of painters; they are placed within open boxes, prototypes-scale models, as if to demonstrate their movement in space. Of particular interest and charm are additional drawings in the margins on leaves 14r, 25v, 44v, 45v, and 46v, reproducing, with a different hand and pen, some additions and/or corrections to the original *Codex*; this could be the work of a contemporary or slightly later scholar.

In detail, the drawings depict 51 systems for moving and lifting weights and monuments, planting poles, windlasses, racks, cranes, column raisers, and pile drivers; 29 hydraulic pumps, mills, wells, fountains, siphons, and presses; 23 machines and tools for siege and military defense (chariots, amphibians, rams, ballistae, catapults, cannons, mobile bridges, ladders, poles, port closures); 11 transport and work carts (hoes, plows); 9 boats and systems for crossing/blocking watercourses (mechanical ships and boats, mobile bridges); 7 various instruments and tools (pliers, drills); 4 trusses, wooden joints, brackets; 2 detection systems for tunnel excavation and an alarm clock.





BINDING

The binding is in contemporary leather over wooden boards with rich blind-stamped decorations; the geometric decorations depict two hexagonal frames that intersect, adorned with plant motifs. In the center of the covers, there is a figure of a blindfolded and winged Cupid holding a bow and about to shoot an arrow. The edges are blue and likely date back to the 18th century (the binding was restored in the 20th century by the Abbey of Viboldone in the "Laboratorio per il restauro del libro" especially at the spine ends and corners, with new ties). The figure of the blindfolded Cupid can be found in some books of the time, such as in Petrarch's *Trionfi* (Venice: Giolito de' Ferrari, 1545), preserved at the Estense Library in Modena. It is also crucial to highlight that, among the machine codexes of the period, the *Santini Codex* is the only one preserving its original binding.

PROVENANCE

Given the extremely high craftsmanship, the use of high-quality vellum, and the refined binding, it is highly probable that the *Santini Codex* was executed by a very skilled technician, either commissioned by the Duke for the library or presented as a gift.

The entry of the *Santini Codex* into the collection of the Dukes of Urbino is post-1498, as it is not recorded in the first inventory of the library, the so-called "Old Index," where, for example, two works by Francesco di Giorgio are registered. However, we know with certainty that the *Codex* belonged to the library of the Dukes Montefeltro and Della Rovere of Urbino, as it is present in the final inventory of the library, compiled by Francesco Scudacchi in 1632. It is one of the few manuscripts that were not transferred to the Vatican Apostolic Library in 1657.

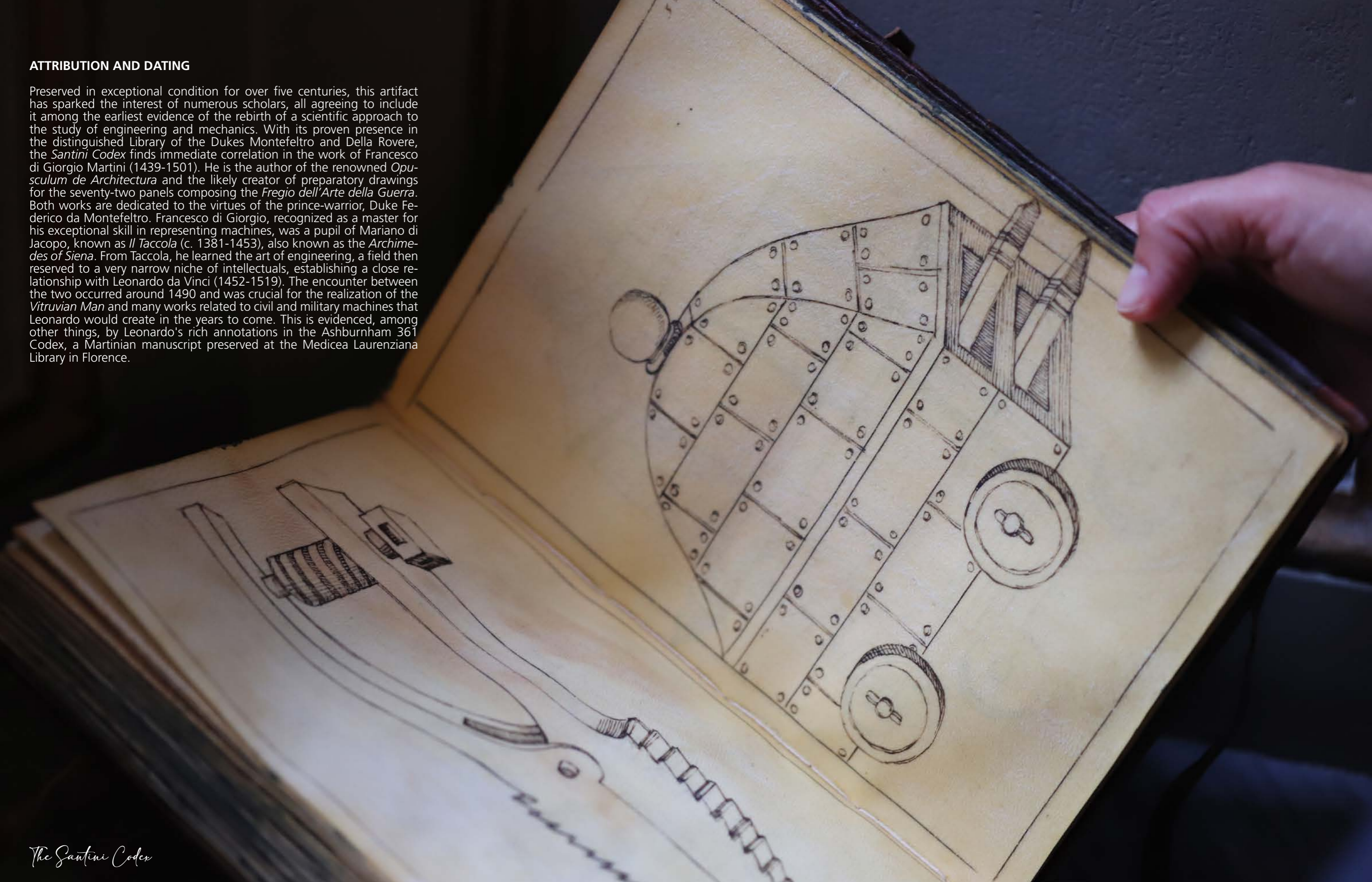
As reported by Dr. Marcella Peruzzi (Codicological Examination in "Some degree of happiness. Studies in the history of architecture in honor of Howard Burns," edited by Maria Beltramini and Caroline Elam. Pisa: 2010), in the 1632 inventory, the entry for the *Codex* is accompanied by the word "manca." The inventory was evidently drafted by copying the first part from a previous inventory and physically checking the presence of volumes on the shelf. The compiler must have noticed the absence of the *Santini Codex* and struck it off the record, adding the note.

The *Codex* was passed down through hereditary succession among noble families in Pesaro and Urbino and has reached its current owners from the De Pretis family of Urbino, who are in turn related to the Gavardini and Antaldi families.



ATTRIBUTION AND DATING

Preserved in exceptional condition for over five centuries, this artifact has sparked the interest of numerous scholars, all agreeing to include it among the earliest evidence of the rebirth of a scientific approach to the study of engineering and mechanics. With its proven presence in the distinguished Library of the Dukes Montefeltro and Della Rovere, the *Santini Codex* finds immediate correlation in the work of Francesco di Giorgio Martini (1439-1501). He is the author of the renowned *Opusculum de Architectura* and the likely creator of preparatory drawings for the seventy-two panels composing the *Fregio dell'Arte della Guerra*. Both works are dedicated to the virtues of the prince-warrior, Duke Federico da Montefeltro. Francesco di Giorgio, recognized as a master for his exceptional skill in representing machines, was a pupil of Mariano di Jacopo, known as *Il Taccola* (c. 1381-1453), also known as the *Archimedes of Siena*. From Taccola, he learned the art of engineering, a field then reserved to a very narrow niche of intellectuals, establishing a close relationship with Leonardo da Vinci (1452-1519). The encounter between the two occurred around 1490 and was crucial for the realization of the *Vitruvian Man* and many works related to civil and military machines that Leonardo would create in the years to come. This is evidenced, among other things, by Leonardo's rich annotations in the Ashburnham 361 Codex, a Martinian manuscript preserved at the Medicea Laurenziana Library in Florence.



STUDIES ON THE SANTINI CODEX

According to **Gustina Scaglia** (1916-2003), the Santini Codex is considered preparatory for the creation of the renown panels of the Fregio dell'Arte della Guerra, which was produced around 1475 for Federico da Montefeltro.

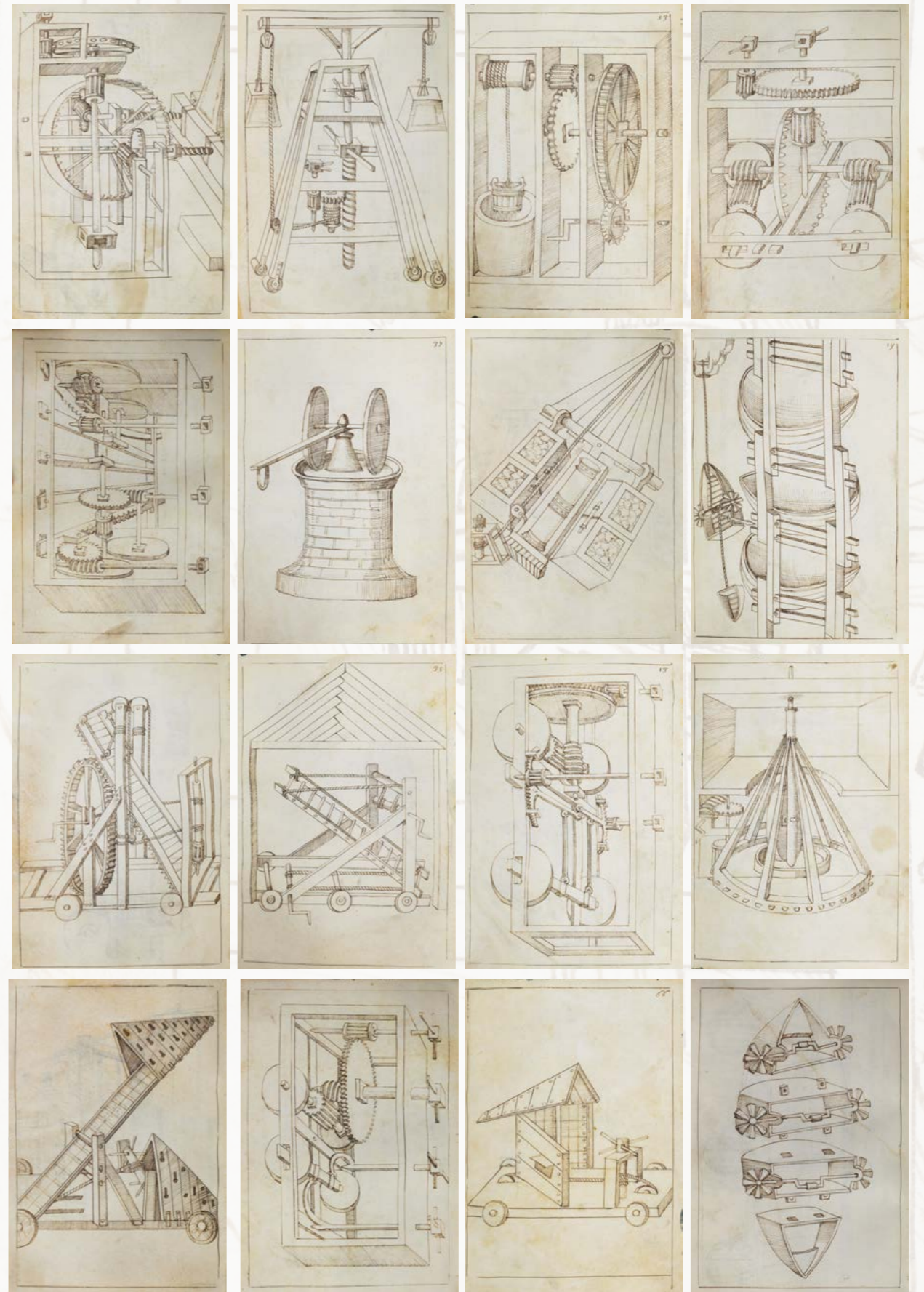
As emphasized by **Sergio Bettini**, the significant tradition of fifteenth-century civil and military machines contributed to immortalizing the myth of the Dukes of Urbino through the creation of the frieze of the art of war.

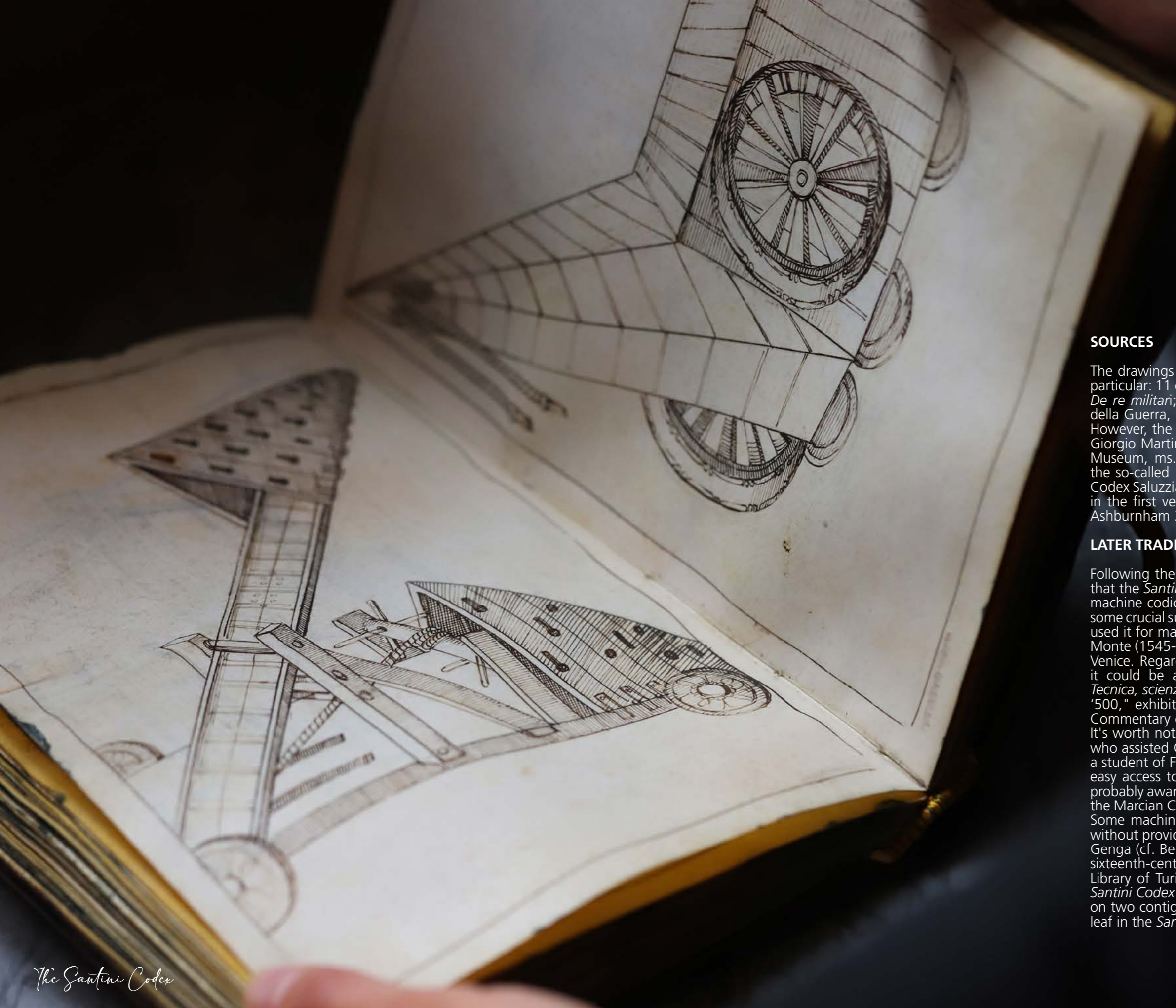
According to **Pier Gabriele Molari**, the *Codex* is to be considered preparatory for the bas-reliefs [of the *Fregio dell'Arte della Guerra*. In *Le macchine come espressione più pura dell'ingegneria e fondamenta del Rinascimento*, Molari also relates the measurements of the Codex to those of the bas-reliefs: the dimensions of the bas-reliefs, without considering the frame, are about three times the dimensions of the *Santini Codex*, which is hypothesized to have been preparatory for the cartoons. The scholar's identification of the three fundamental moments in the project of the *Fregio dell'Arte della Guerra* is interesting: in the first moment, the "sketch" is conceived, corresponding to the formation of the idea - Codice Urbinate Latino 1757 of the Vatican Library; then comes the "ucelletto," or the drawing presented for the approval of the client - Codice Mss. Latini VIII n. 87 belonging to Guidobaldo dal Monte; finally, there is the "preparatory drawing" executed on a larger scale and used to prepare the actual cartoons for the stonemasons, the *Santini Codex*.

Paolo Galluzzi in the descriptive note on the Santini Codex on page 210 of the catalogue *Prima di Leonardo*, suggests a dating around the year 1500: "A manuscript of notable interest, which shows evident connections with Ms. Lat. Urb. 1397 (v.l.g.6) preserved at the Vatican Library. *The Santini Codex* consists of a substantial section of copies from Francesco di Giorgio's *Opusculum de Architectura* with some omissions, such as the floor plans of fortresses, as well as some additions. Among the additions, the final 15 pages are noteworthy, reproducing some of the sculpted subjects from the panels of the Ducal Palace of Urbino. In some of these drawings, decorations similar to those characterizing the panels can be observed (see, for example, the siphon on page 65v). The anonymous author likely drew inspiration from the reliefs of the architectural frieze or from a lost codex that contained the preparatory drawings of Francesco and/or his Urbino assistants. Regarding the dating, it is hypothesized that the manuscript was likely composed around the year 1500" (page 210, entry by Paolo Galluzzi, l.f. 5)s.

Grazia Bernini Pezzini, discusses mechanical problems in Francesco di Giorgio Martini's Urbinate frieze. She mentions a rare loan indication from the old library index dated between 1525-30 of Francesco di Giorgio Martini's *Opusculum de architectura* to Battista Comandino. Pezzini suggests that the original Martinian Codex had already been copied on commission for the Dukes of Urbino to send to the Savoy family. She hypothesizes that during the same event, within the Comandino family, another copy might have been made, possibly the one owned by the Santini family or a prototype from which the *Santini Codex* depends.

Based on this discovery, **Marcella Peruzzi** believes that the *Santini Codex* could have been executed by Giovanni Battista Comandino. This information is also included in the decree of cultural interest notification of the *Codex* by the *Soprintendenza*. Giovanni Battista Comandino, father of the famous mathematician Federico Comandino (1509-1575), is known for designing the walls of Urbino for Duke Guidubaldo da Montefeltro. Peruzzi further speculates that Giovanni Battista Comandino or his son Federico may have donated the *Codex* to the Dukes of Urbino.





SOURCES

The drawings are closely connected and inspired by specific sources, in particular: 11 or 12 are linked to Roberto Valturio and his renowned work *De re militari*; 18 are drawn from the 72 panels of the Fregio dell'Arte della Guerra, which adorned the facade of the Ducal Palace of Urbino. However, the most significant source undoubtedly remains Francesco di Giorgio Martini, with 96 drawings derived from the *Opusculum* (British Museum, ms. 197.b.21, known as Codex Harley 3281) and 35 from the so-called "second version" of the *Trattato de Architectura*, namely Codex Saluzziano 148 (1482-1486). The same images are nearly identical in the first version of the *Trattato* (1480-1482), represented by Codex Ashburnham 361 annotated by Leonardo.

LATER TRADITION

Following the dispersion of the Martinian codices, it is highly probable that the *Santini Codex* had become a reference text for civil and military machine codices in the Library of Urbino. It likely served as a model for some crucial subsequent works. For example, Alberto Alberti (1526-1598) used it for machines reproduced in some drawings, and Guidobaldo dal Monte (1545-1607) for the *Organa mechanica* in the Marciana Library in Venice. Regarding the *Santini Codex*, Vincenzo Fontana has suggested it could be an early work of Guidobaldo himself (see V. Fontana, *Tecnica, scienza e architettura* in "Architettura e utopia nella Venezia del '500," exhibition catalogue curated by L. Puppi, Milan: Electa, 1980; in Commentary on the facsimile, in G. del Monte, *Organa Mechanica*). It's worth noting that Guidobaldo dal Monte, a famous mathematician who assisted Galileo in obtaining a chair at the University of Padua, was a student of Federico Comandino and the master of Baldi. He likely had easy access to the ducal library and, being a student of Federico, was probably aware of the *Santini Codex*. A total of 93 drawings are copied in the Marcian Codex, and the *Santini Codex* appears to be its main source. Some machines are reproduced in the same order. Vincenzo Fontana, without providing arguments, has also attributed the *Codex* to Girolamo Genga (cf. Bettini, "Intorno a Francesco di Giorgio," p. 82). Finally, in a sixteenth-century copy of the *Opusculum* now preserved in the Royal Library of Turin, there are 96 drawings on 95 leaves derived from the *Santini Codex*. While not in the same order, sometimes machines placed on two contiguous cards in the reference codex are found on the same leaf in the *Santini Codex*.

EXHIBITIONS

Prima di Leonardo. Cultura delle macchine a Siena nel Rinascimento. Siena: Magazzini del sale, 9.6.1991-30.9.1991.

In this exhibition, all the most important machine codexes from libraries across Europe were showcased, delving into the extraordinary experience of artist-engineers in Siena. The exhibition focused on the tradition of machines developed in the 15th century in certain centers of Tuscany and the Marches, which later influenced Leonardo da Vinci in his inventions.

"The *Opusculum*... will have an unheard-of fortune. I do not know a technical text that has been copied integrally or partially plundered so many times, nor one that has inspired the imagination of technicians, illustrators, or publishers of technical texts for so long." - Paolo Galluzzi. *Le macchine senesi. Ricerca antiquaria, spirito di innovazione e cultura del territorio* (p. 36)

Radici e sviluppo della tradizione scientifica urbinata: Federico da Montefeltro e il Gabinetto di Fisica dell'Università, mostra allestita in occasione del V centenario dell'Università di Urbino presso il Museo del Gabinetto di Fisica. Urbino: Collegio Raffaello, 23.9.2006- 1.3.2007.

In the exhibition description, the Santini Codex, available in digital copy, is described as a "rare codex of machine drawings from the late 15th century. The codex reproduces 136 drawings of war machines or social utility, possibly attributable to a collaborator of Francesco di Giorgio Martini."

Sapientia, Pietas et Otium al tempo del duca Federico da Montefeltro. Urbino: Cattedrale di S. Maria Assunta, 2022. In this exhibition, the *Santini Codex* was digitally browsable.

BIBLIOGRAPHY

Grazia Bernini Pezzini. *Problemi di meccanica nel fregio urbinata di Francesco di Giorgio Martini*, in "Notizie da Palazzo Albani", 1983, pp. 51-58.

Gustina Scaglia. *Appendix II. Drawings in add. 34113, The British Library, and in Codex Santini, Urbino. Machines and structures developed from the Notebook of Taccola. The machine complex, in Mariano di Jacopo detto il Taccola. De ingeneis. Liber primus leonis, liber secundus draconis, addenda.* Wiesbaden: 1984, vol.I, pp. 30, 160-171.

Grazia Bernini Pezzini. *Il fregio dell'arte della guerra nel Palazzo ducale di Urbino. Catalogo dei rilievi.* Roma: 1985.

"The oldest sources known so far that feature images presumably derived from the frieze consist of two codices of drawings, one from the Vatican Library (Urb. Lat. 1397) and the other owned by Lawyer Santini of Urbino, both dating back to the 16th century; to these, the drawings of Alberto Alberti from the National Print Cabinet must be added...". The sequence of drawings in the two codices is entirely different (pp. 16-17).

Paolo Galluzzi (a cura di). *Prima di Leonardo. Cultura delle macchine a Siena nel Rinascimento.* Siena: Magazzini del sale, 9.6.1991-30.9.1991.

Gustina Scaglia. *Francesco di Giorgio. Checklist and history of manuscripts and drawings in autographs and copies from ca. 1470 to 1687 and renewed copies. 1764-1839.* Londra: 1992, pp. 104-107 e passim.

In this volume, the scholar provides a list of all codexes by Francesco di Giorgio, comparing and relating them to each other. Regarding the Santini Codex, she states that there are "machine drawings identical to those of Francesco's *Opusculum*... without notes of any kind, without human figures and landscape elements, which would be useful in deciding its authorship". The scholar closely associates the *Santini Codex* with Urb. Lat. 1397, despite some technical differences: the stroke, the frames, the shading of screws, and the way to render gears. Therefore, "the close interrelation of these two codexes indicates the two artists worked together in Siena".

Luisa Molari e Pier Gabriele Molari, *Una 'cartolina' firmata da Francesco di Giorgio nelle formelle del Palazzo Ducale di Urbino*, in AIAS 2006: "Atti del 35. Convegno nazionale dell'Associazione italiana per l'analisi delle sollecitazioni. Ancona: 13-16 settembre 2006 / a cura di Dario Amodio", Perugia: 2006, pp. 13-16.

After establishing the chronological sequence of Francesco di Giorgio's Notebook, the *Santini Codex*, and the Marciano Codex Lat. VIII.87(=3048), the authors examine panel 50. This panel depicts a screw mechanism with a movable crossbar at the top and a thin crossbar at the bottom. They compare it with the drawing on f. 157r of Urb. lat. 1752 and f. 48v of the *Santini Codex*: http://www.giovannipastore.it/AIAS2006/memoria_Molari.pdf

Sergio Bettini e Marcella Peruzzi. *Intorno a Francesco di Giorgio: un codice di macchine civili e militari della collezione Santini*, in "Some degree of happiness. Studi di storia dell'architettura in onore di Howard Burns", a cura di Maria Beltramini e Caroline Elam. Pisa: 2010.

Pier Gabriele Molari. *Le Macchine come espressione più pura dell'ingegneria e fundamenta del Rinascimento.* Bologna: Scuola Officina, June 2014. http://informa.comune.bologna.it/iperbole/media/files/so_1.2014__molari.pdf

For further bibliography and for references to some digital copies of the cited codexes: https://formelle.uniurb.it/?page_id=3110

For the series of conferences on the *Fregio dell'Arte della Guerra* held in 2022: https://formelle.uniurb.it/?page_id=1029

For the research project of the University of Ghent developed by Prof. Elizabeth Merrill with the collaboration of Rebecca Sartore dedicated to Francesco di Giorgio's *Opusculum de Architectura*, its reception and fortune in the sixteenth century. <https://www.ugent.be/ea/architectuur/en/research/research-projects/all-research-projects/architecture-of-machines-francesco-di-giorgios-opusculum-de-architectura-the-praxis-of-renaissance-architecture>

"In mastering the art of mechanics - and amassing a critical knowledge of the natural world - Urbino might emerge as a new Rome, an empire to surpass all others."