

“TRANSPLANTING THE HUMAN MIND
INTO INANIMATE MATTER”

LEIBNIZ’S RECKONING MACHINE
SEEN FROM A MEDIA PERSPECTIVE

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Introduction: the classical narratives on Leibniz's reckoning machine

1. Alternative narratives and stating the problematic of re-mediation
2. Beyond the drawing-as-mere-communication argument
3. Re-mediating long multiplication from paper to brass and wood

Conclusion: research threads, paper trails, and brass models

Introduction: the classical narratives on Leibniz's reckoning machine



Gottfried Wilhelm Leibniz
(1646-1716)

- 1672: arrival in Paris, first written ideas
- 1673: wooden model for the Royal Society
- 1675: brass model for the Académie des sciences
- 1677-1700: “*Altere Maschine*” in Hannover
- 1697-1712: “*Jungere Maschine*” between Hannover, Helmstedt, Zeitz

Introduction: the classical narratives on Leibniz's reckoning machine

- 1879: rediscovered in Göttingen
- 1897: Arthur Burkhardt (manufacturer of arithmometers) tried to "fix" it

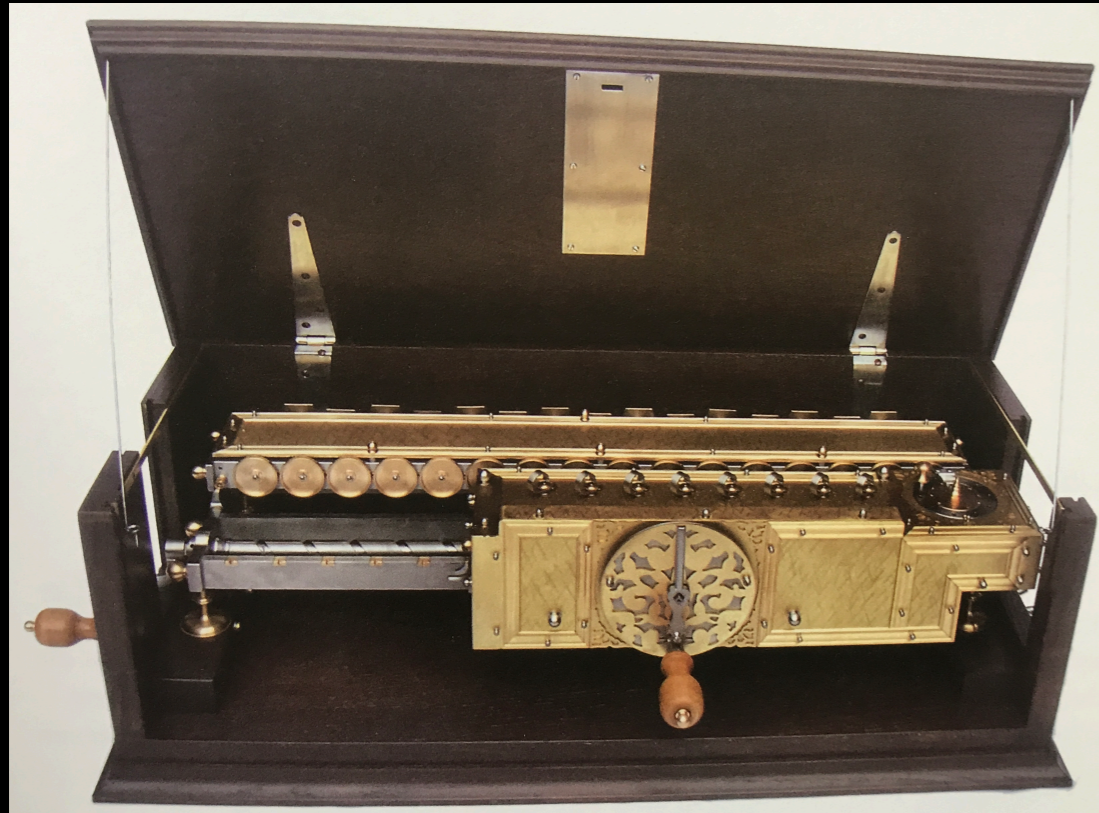
"Original reconstructions" (*Originalgetreue Nachbauten*):



ca. 1924: Brunsviga
(arithmometer firm)

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“Original reconstructions” (*Originalgetreue Nachbauten*):



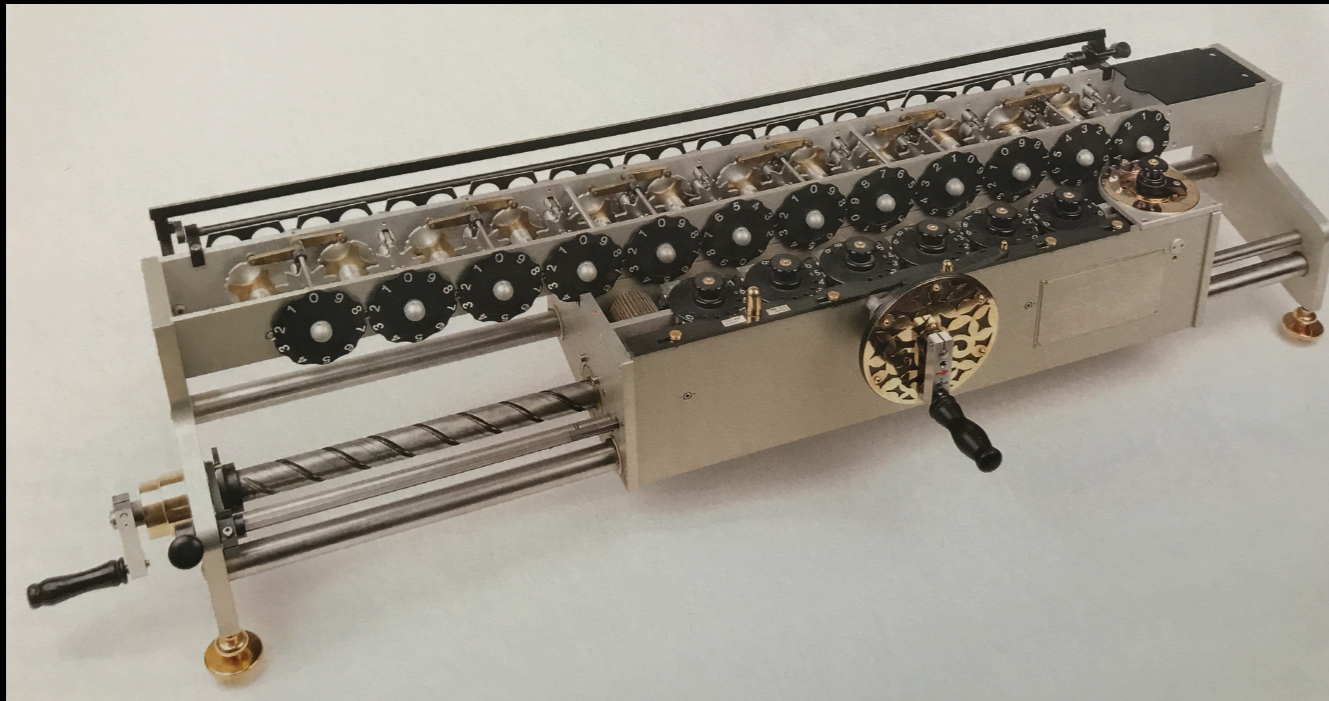
2005: Badur and Rottstedt
“Und sie rechnet doch richtig!”



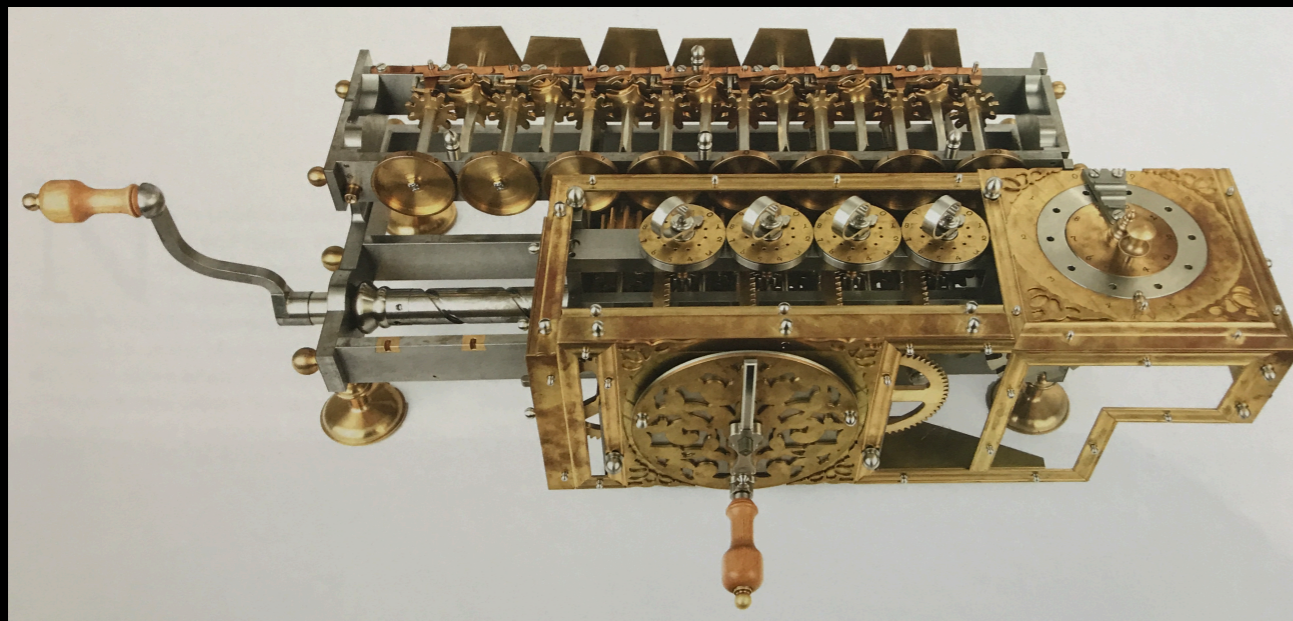
2008: Wolff
(Bonn University)

Introduction: the classical narratives on Leibniz's reckoning machine

“Constructively altered reconstructions” (*Nachbauten mit konstruktiven Änderungen*):



2005: Stein and Kopp
(Hannover University)



2008: Badur and Rottstedt
(Bonn University)

Introduction: the classical narratives on Leibniz's reckoning machine

Walsdorff, Badur, Kopp (eds.), *Das letzte Original: Die Leibniz-Rechenmaschine der Gottfried Wilhelm Bibliothek*, Hannover: GWLB, 2015.



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“Mutig, visionär und ungeheuer kreativ erfand er [Leibniz] Maschinen auf dem Papier.”

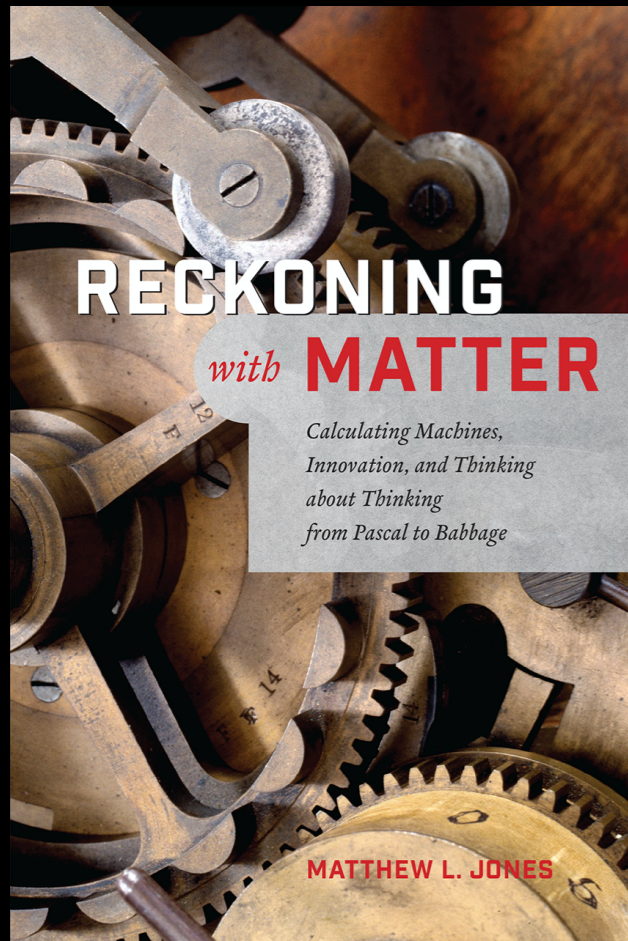
“Brave, visionary, and incredibly creative, Leibniz invented machines on paper.”

1. Alternative narratives and stating the problematic of re-mediation

Florin-Stefan Morar, “Reinventing Machines: the Transmission History of the Leibniz Calculator,” *British Journal for the History of Science*, 48(1):123-146, 2015.

- Reassess the material legacy of Leibniz’s calculating machine
- Discuss the writing of history through reconstruction
- Debunk the rhetorics of certain reconstructions

1. Alternative narratives and stating the problematic of re-mediation



Matthew L. Jones, *Reckoning with Matter: Calculating Machines, Innovation, and Thinking about Thinking from Pascal to Babbage*, Chicago: Chicago University Press, 2016.

- “Sociality of materiality”
- Debunk the conception of innovation as “hylomorphic”
- Reappraise the figure of the craftsman

Yet, still just a matter of communication...

1. Alternative narratives and stating the problematic of re-mediation

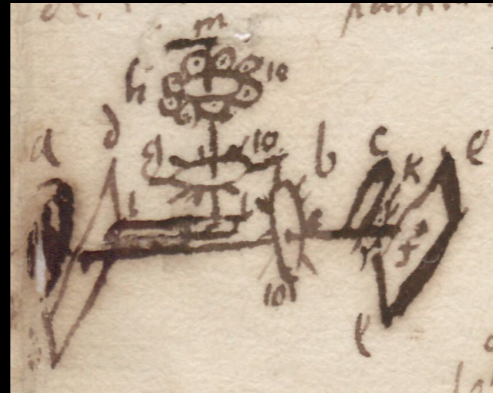
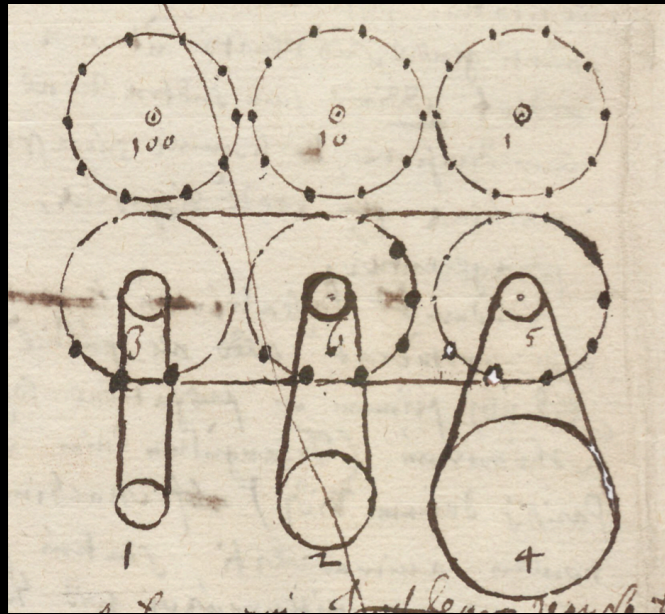
What does Leibniz's reckoning machine owe to its *paper substrate*?

or

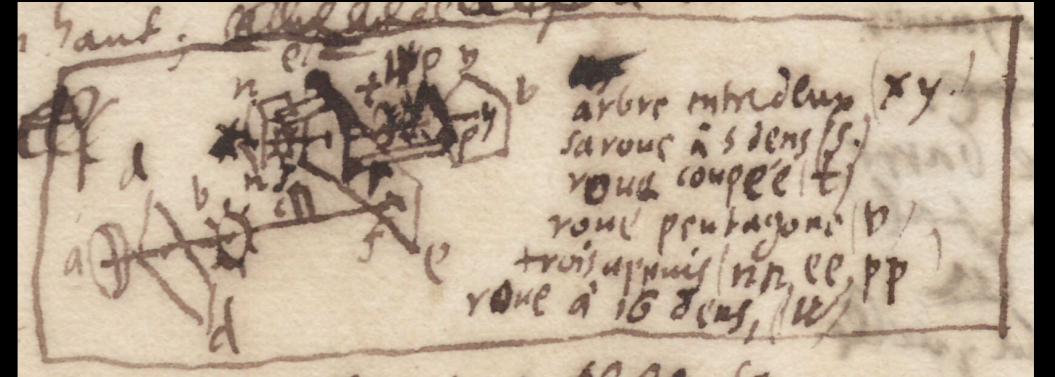
Conceiving of the 2D->3D "inverse" projection as a material translation from one medium to another, *i.e.*, as a *re-mediation from paper to cogs&wheels*, how was this machine shaped by a certain use of paper?

2. Beyond the drawing-as-merely-communication argument

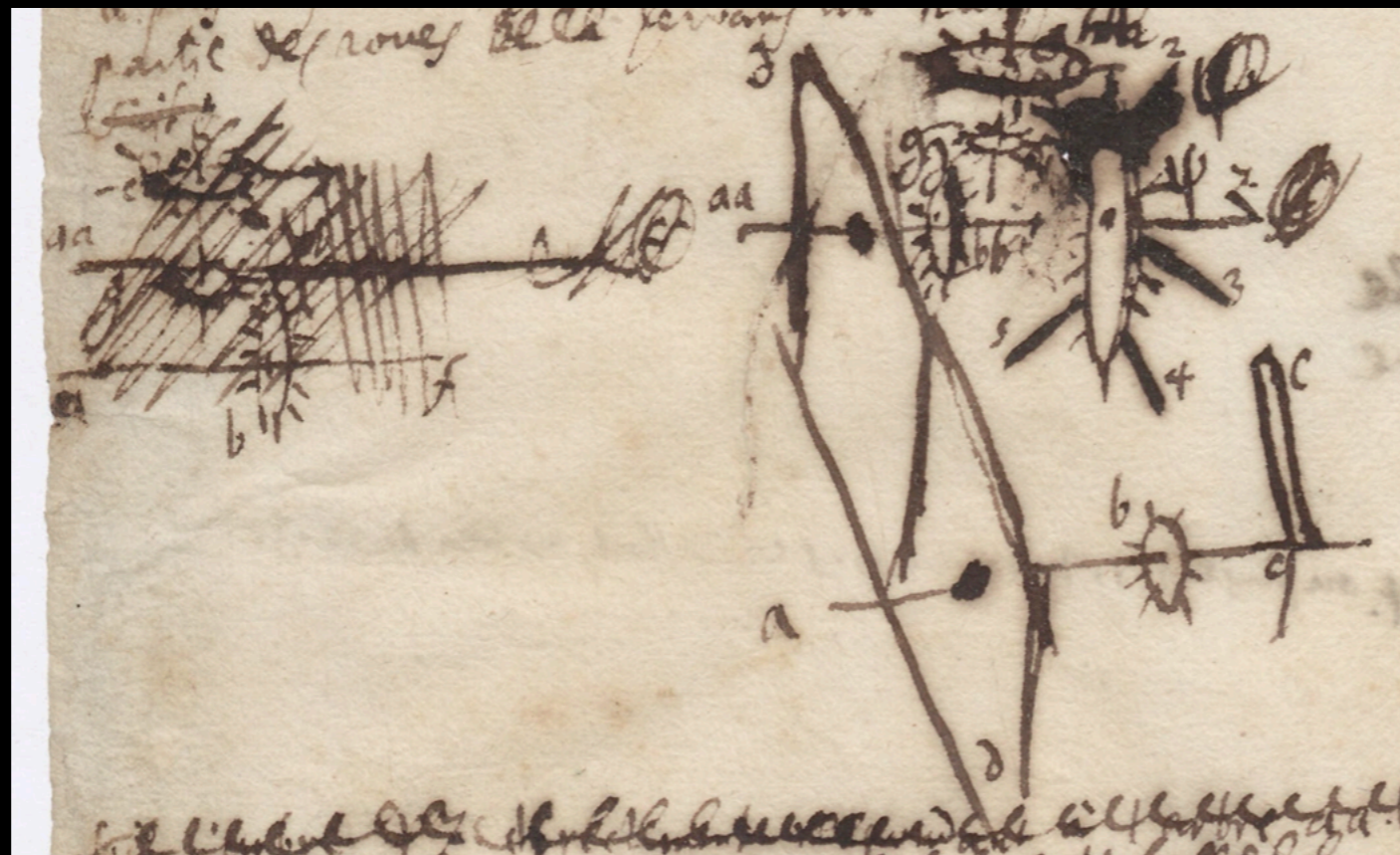
LH XLII, 5, f° 1v.



f° 11r



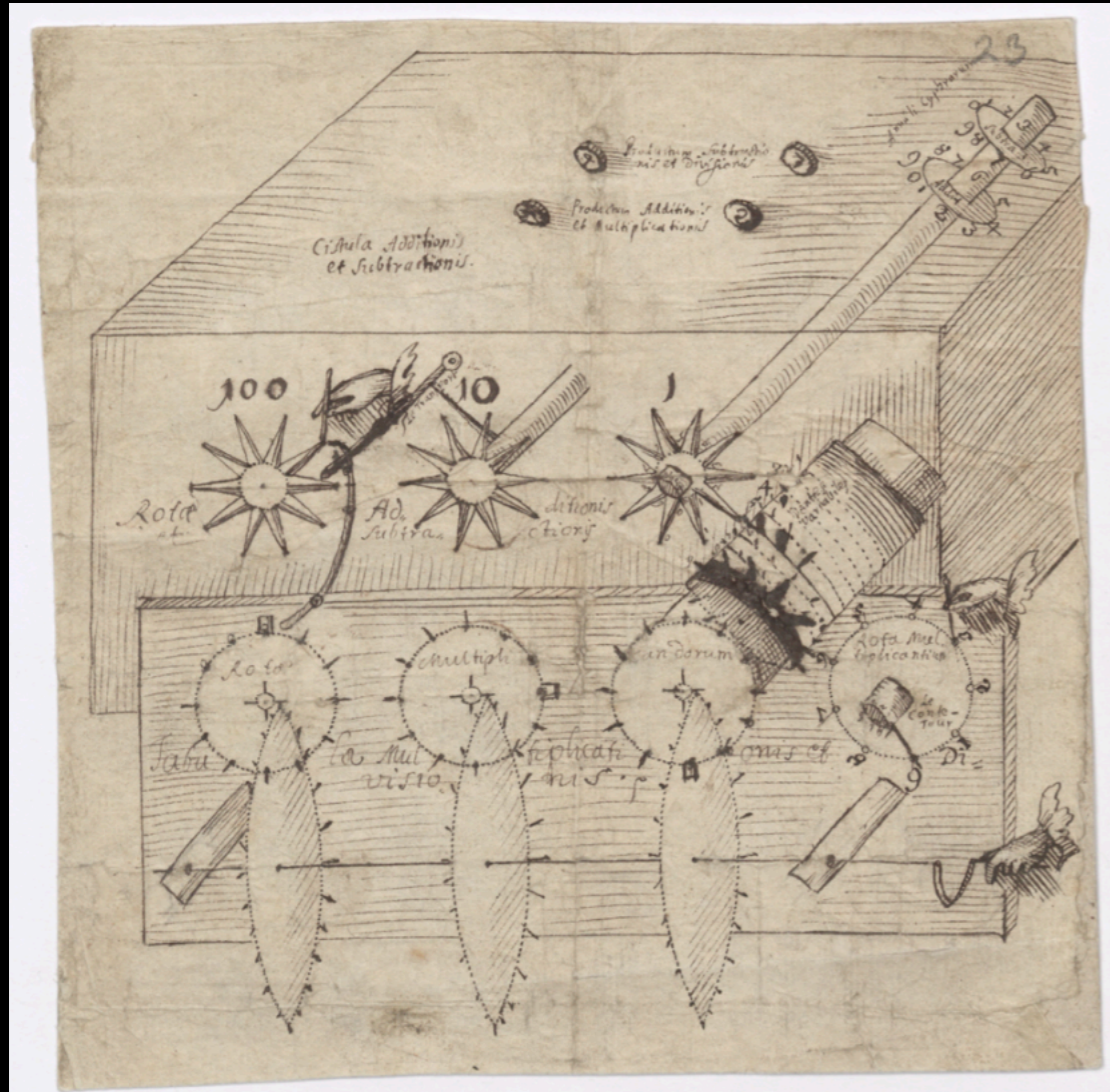
f° 11v



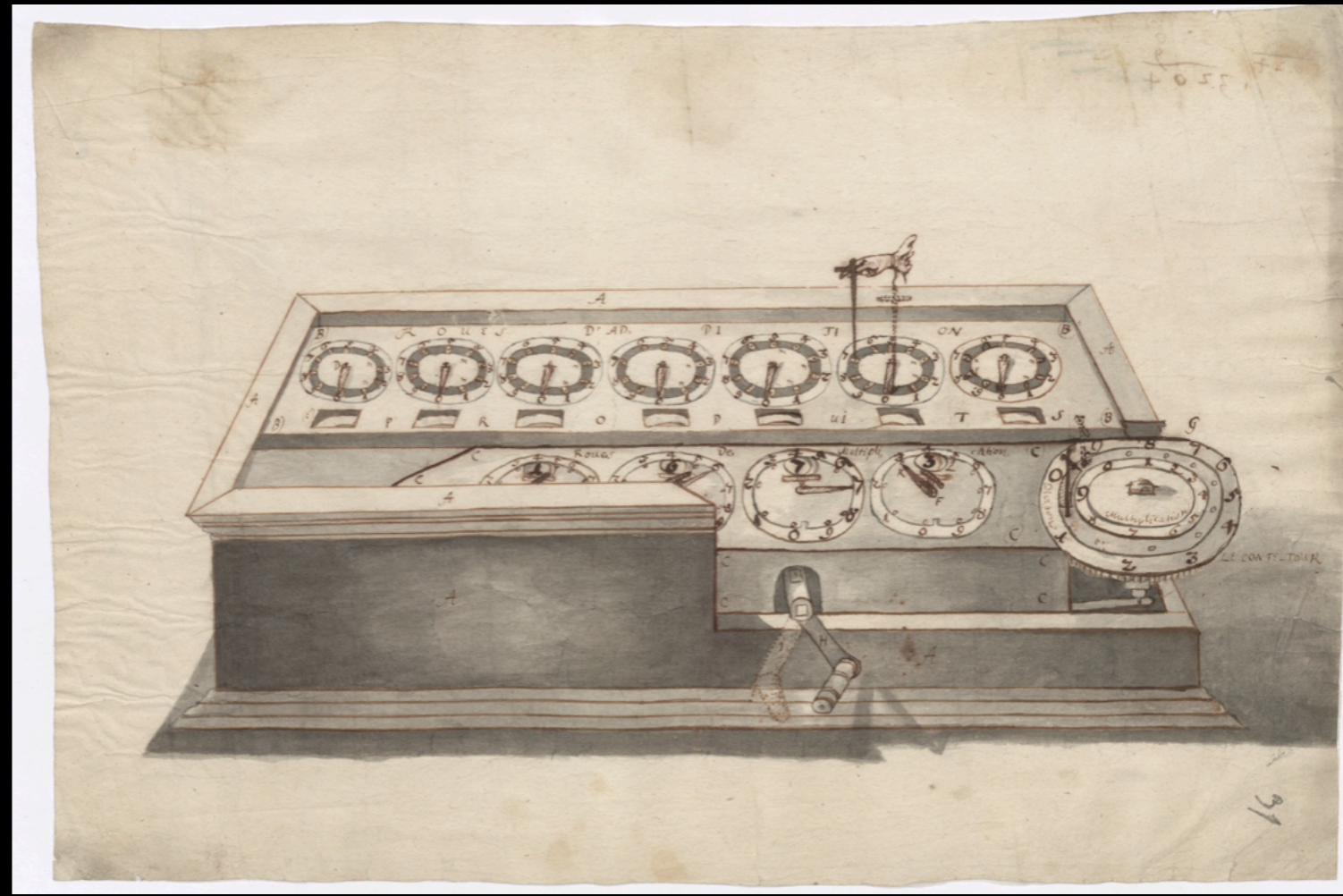
f° 12v

2. Beyond the drawing-as-mere-communication argument

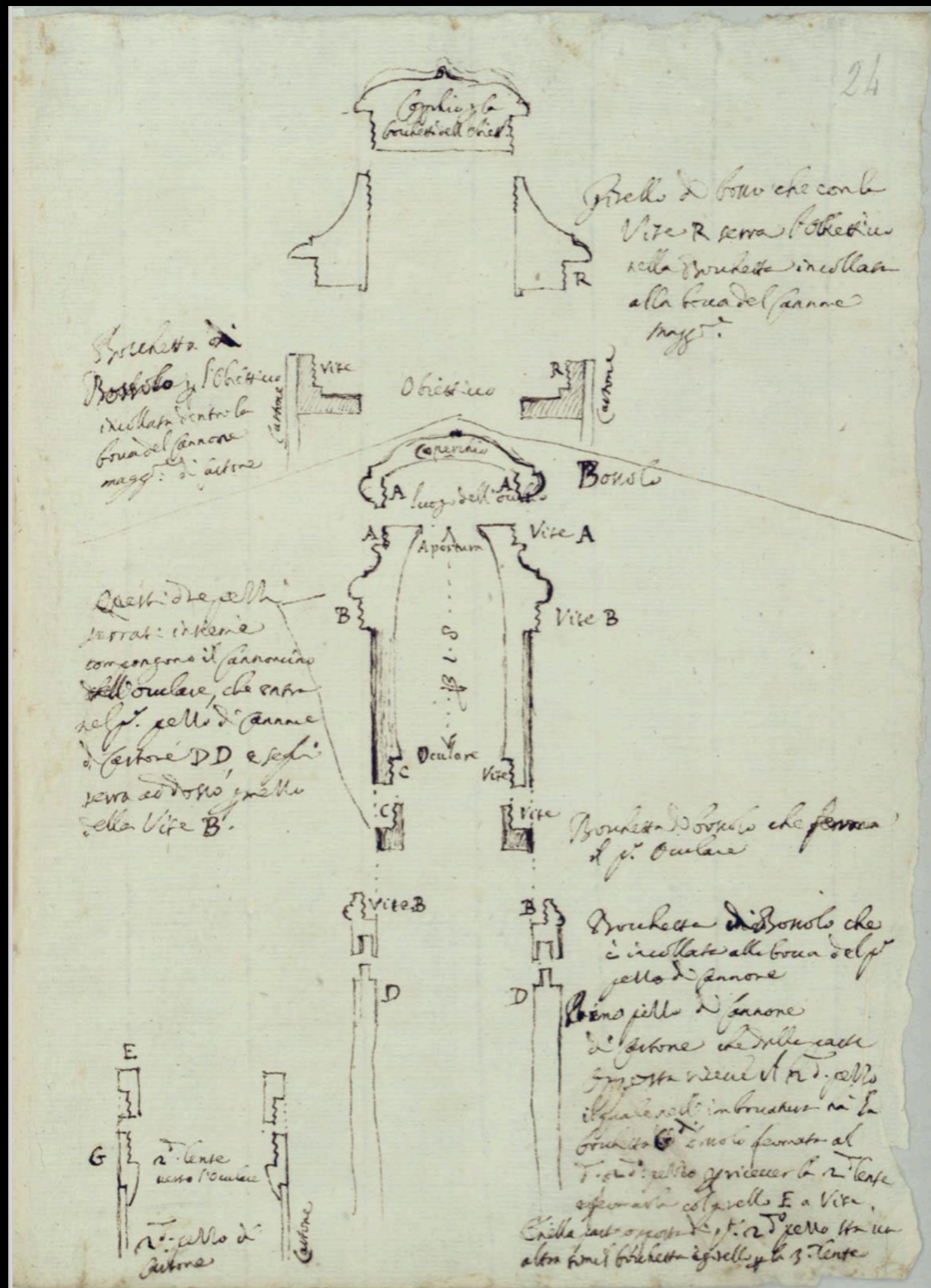
LH XLII, 5, f° 23r.



f° 31r



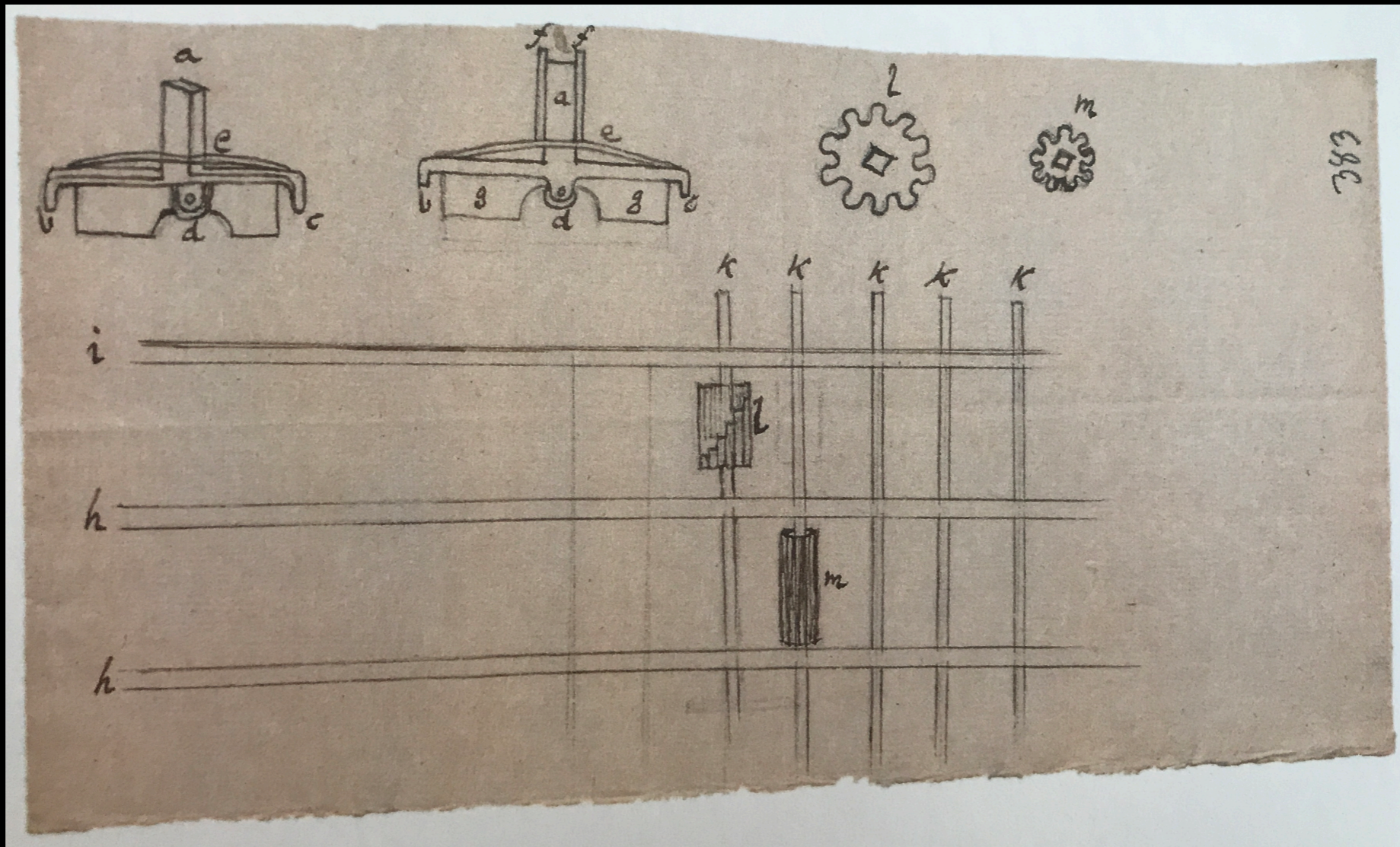
2. Beyond the drawing-as-mere-communication argument



Biblioteca Nazionale Centrale
Firenze,
Fondo Galileano
Gal. 243, f° 24r.

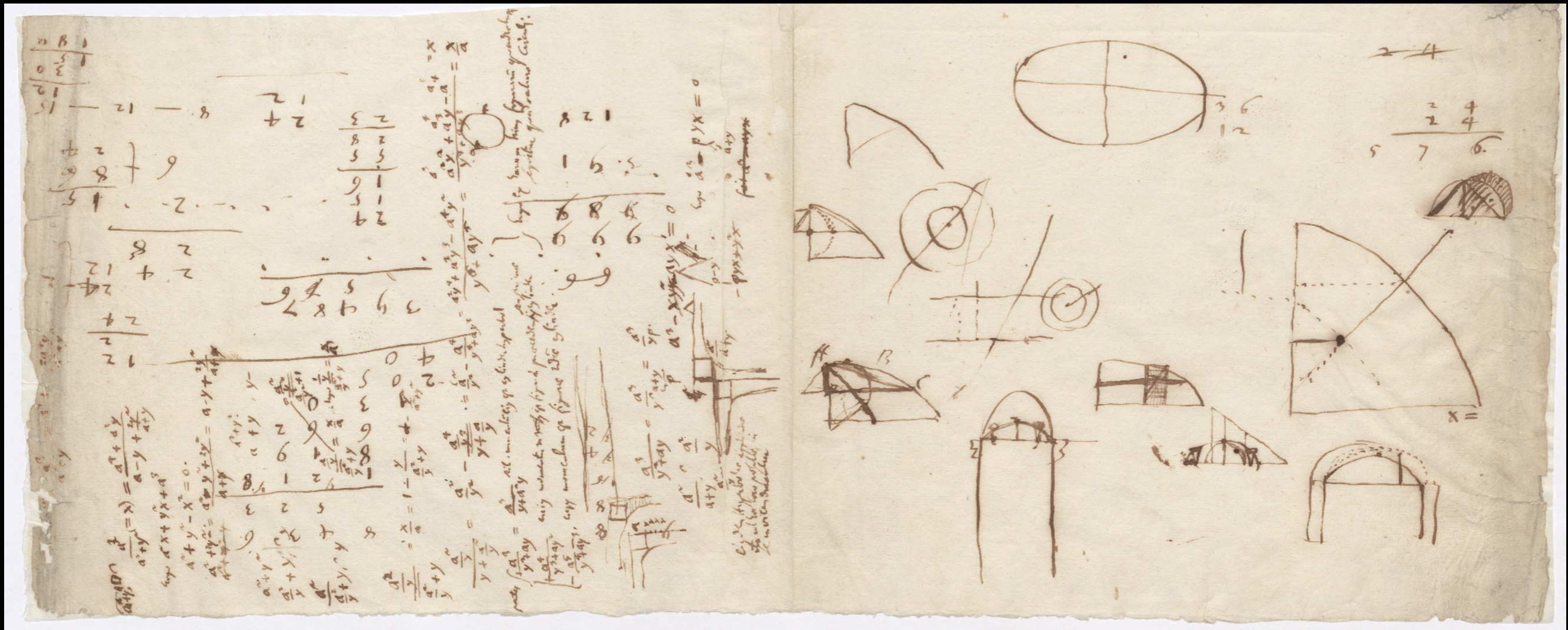
Vincenzio Viviani's exploded
view of a telescope

2. Beyond the drawing-as-mere-communication argument



Christian Wagner's drawing
of the stepped drum in a
letter to Leibniz

2. Beyond the drawing-as-merere-communication argument



LH XLII, 5, f° 27r.

2. Beyond the drawing-as-mere-communication argument



LH XLII, 5, ff° 11rv.

2. Beyond the drawing-as-mere-communication argument

Ma machine Arithmétique de la manière
que je l'ay fait faire à Paris l'an 1674 //

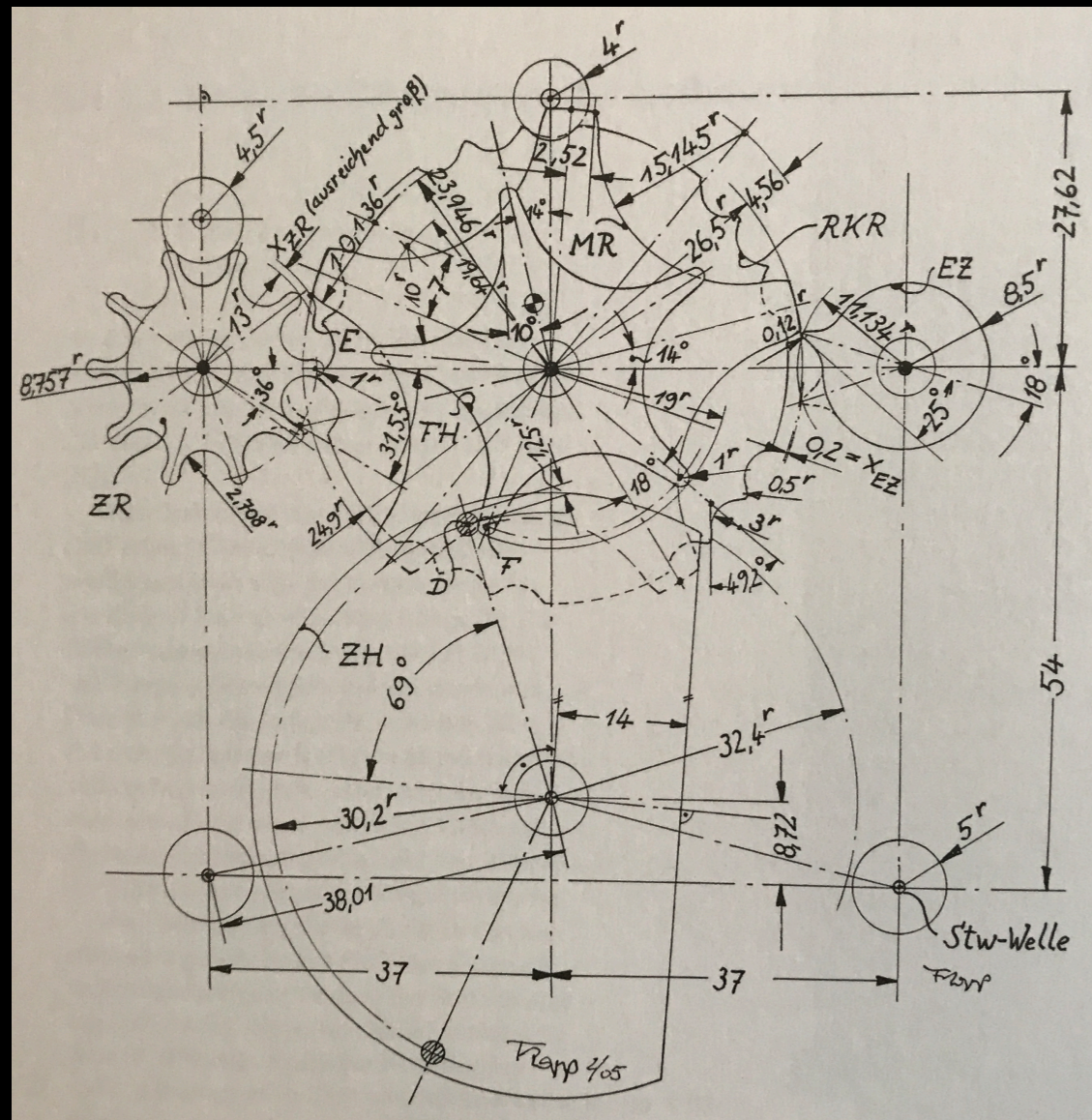
J'ay fait cette description à
Hanover l'an 1695 au mo
de juillet, ayant la
machine devant moy.

Elle consiste en deux pieces, dont l'une
est mobile l'autre immobile. La partie
mobile sert pour l'addition aussi bien que pour
la multiplication. Mais la partie immobile est
essentiellement nécessaire pour la multiplication.

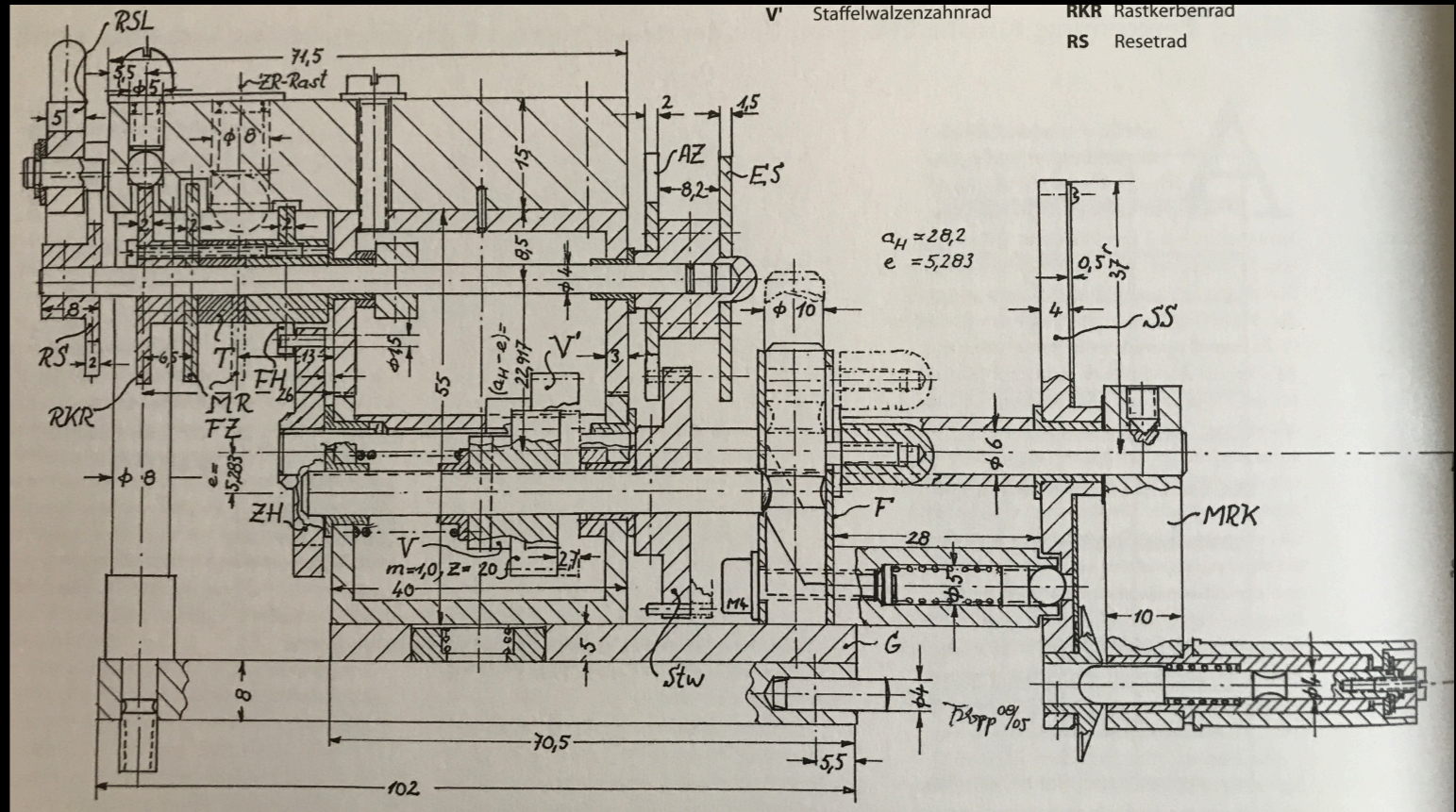
La partie immobile est divisée en
deux parties, qui se considèrent comme
parties, qu'il y a de chiffres dans les
dixaines, centaines, &c. outre les transports entre deux

Les Nombres ont un arbre horizontal
et un arbre vertical. L'arbre horizontal
passe par deux barres ^{verticales} qui sont
machine. La partie en l'air de la première
de droit à gauche (à l'égard de celui qui se sert
de la machine) il perce la première et n'est qu'
appuyé dans la seconde. La partie en l'air de la première
barre porte une roue sans dents, qui est divisée en dix
ou il y a du papier colle dessus, qui est divisée en dix

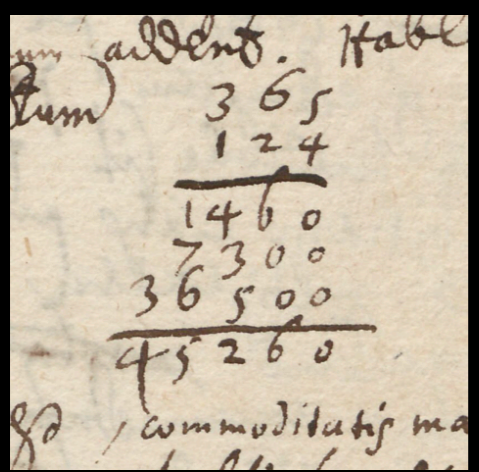
2. Beyond the drawing-as-mere-communication argument



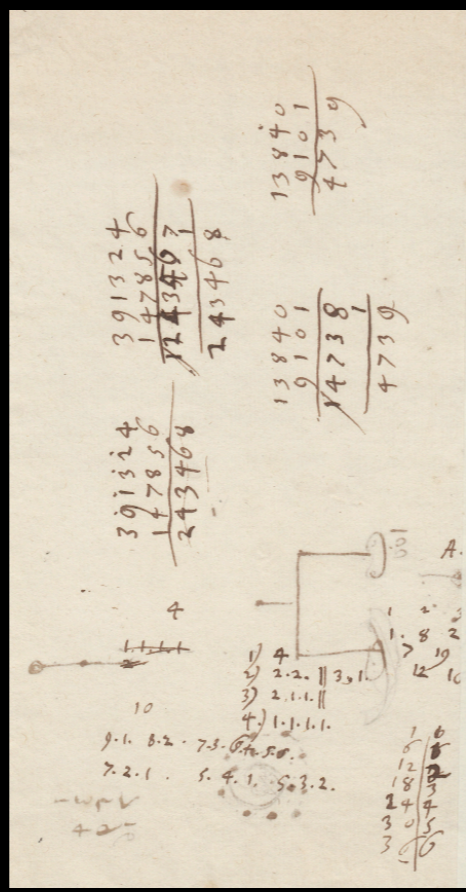
Das letzte Original,
p. 198 (left) and p. 234 (right).



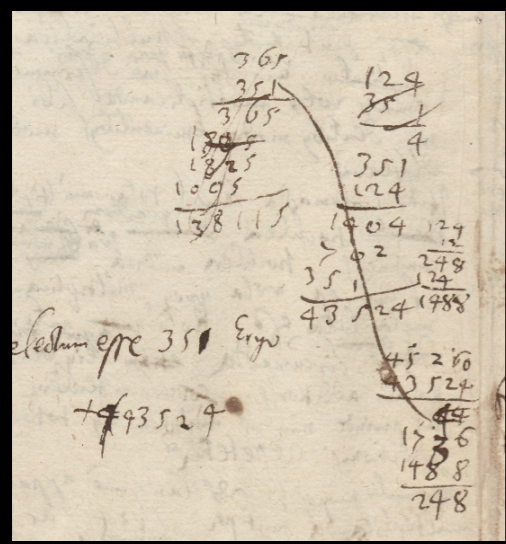
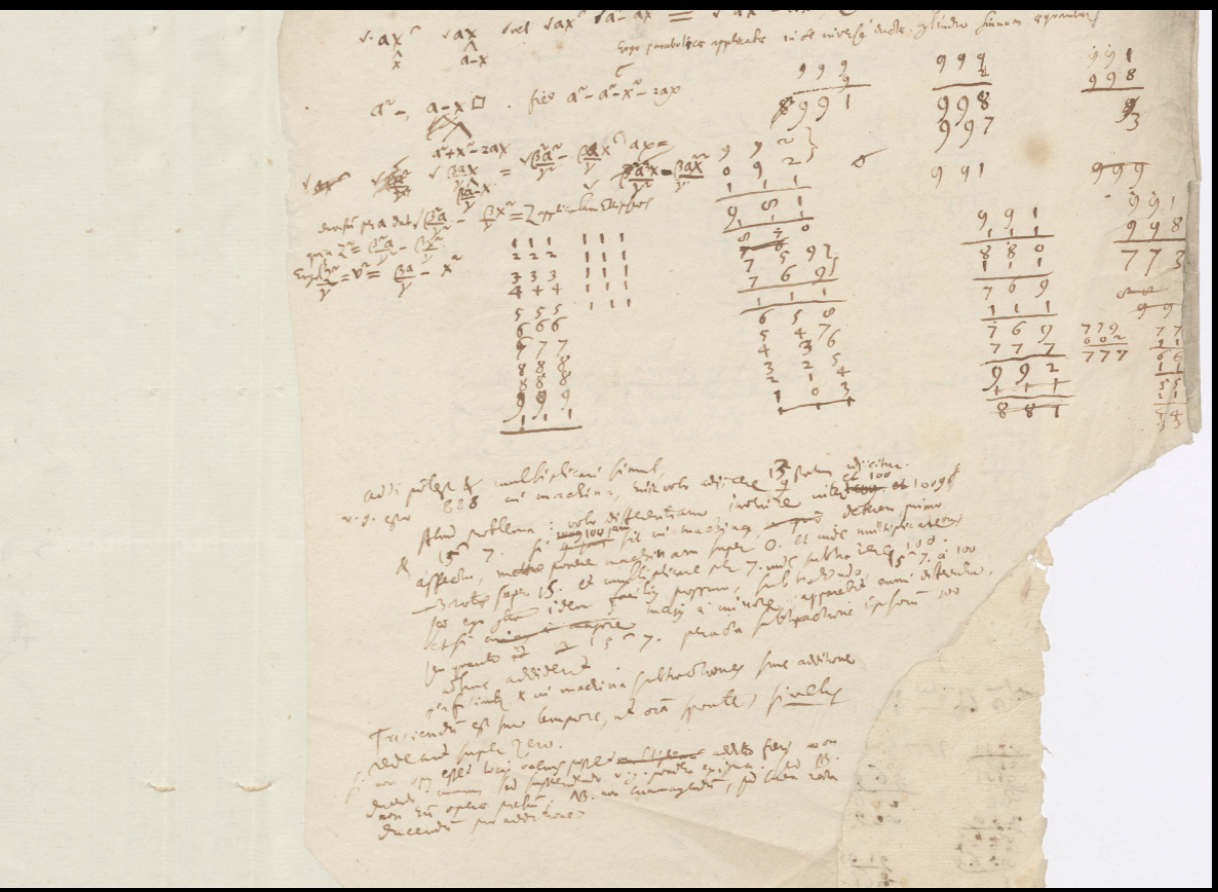
3. Re-mediating long multiplication from paper to brass and wood



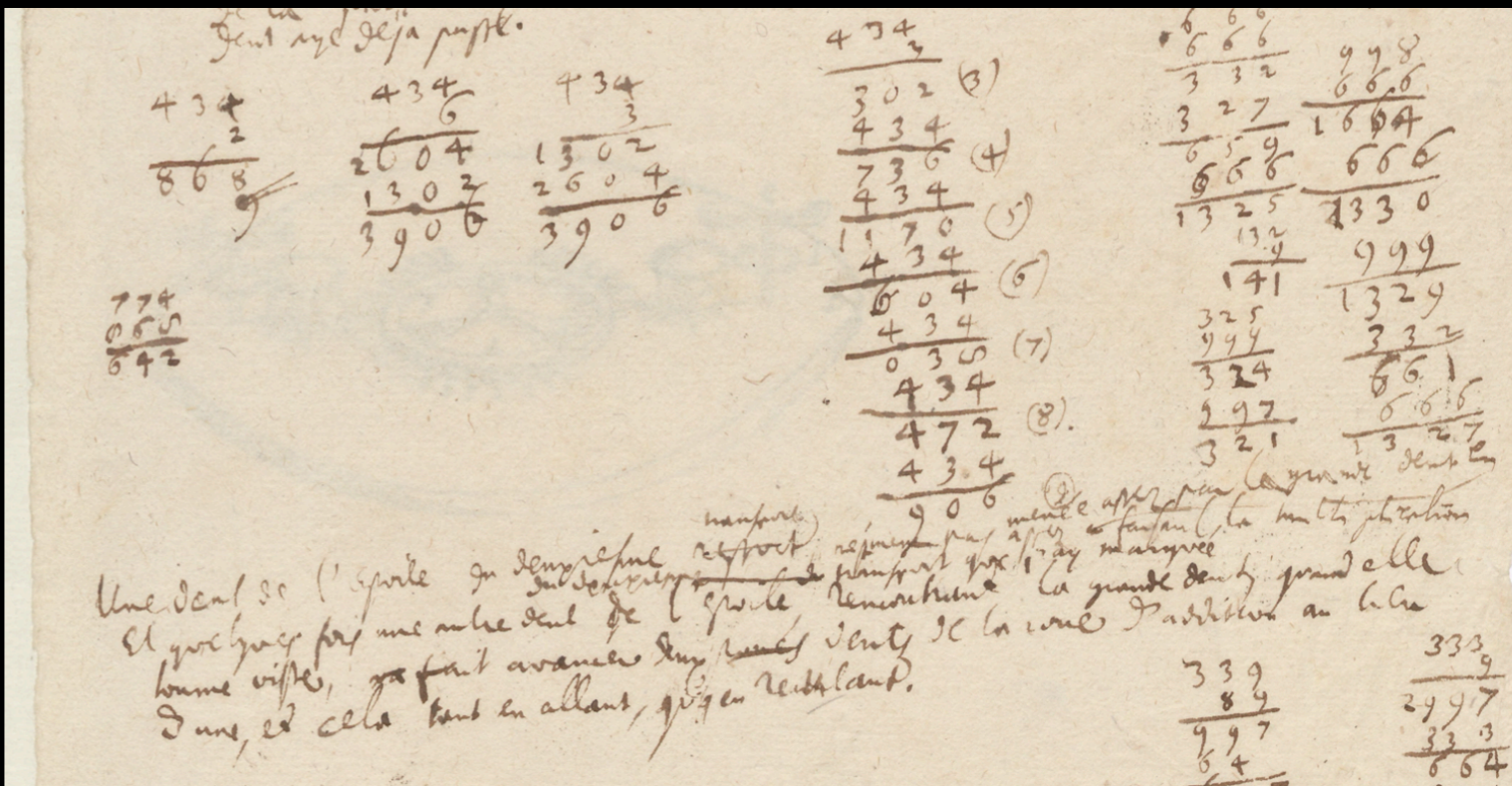
LH XLII, 5, f° 4r.



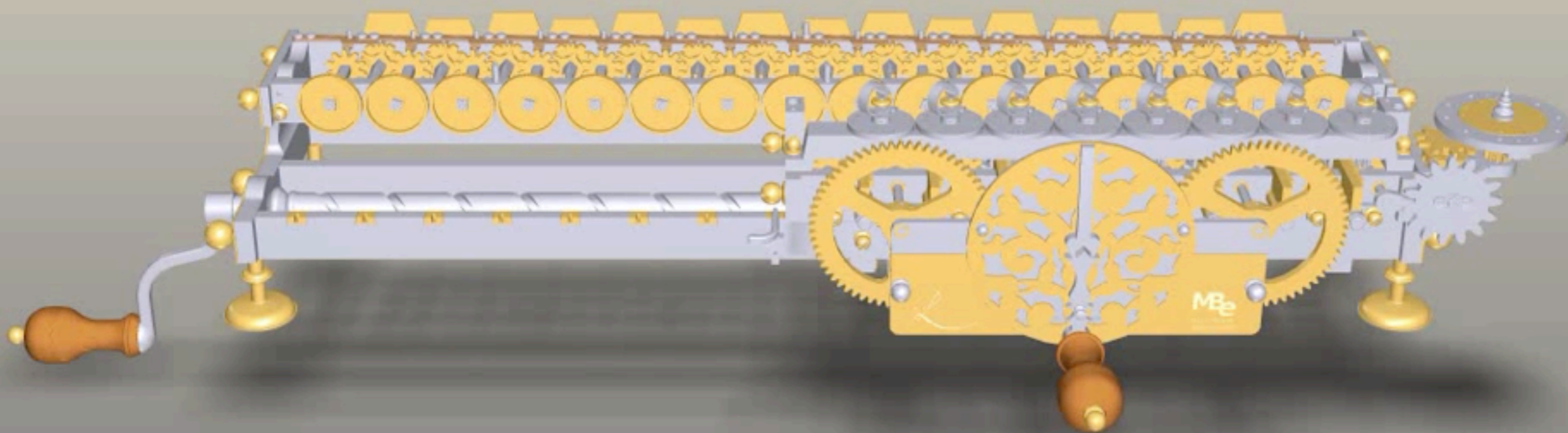
ff° 6v-7r



f° 4v



f° 7v



3. Re-mediating long multiplication from paper to brass and wood

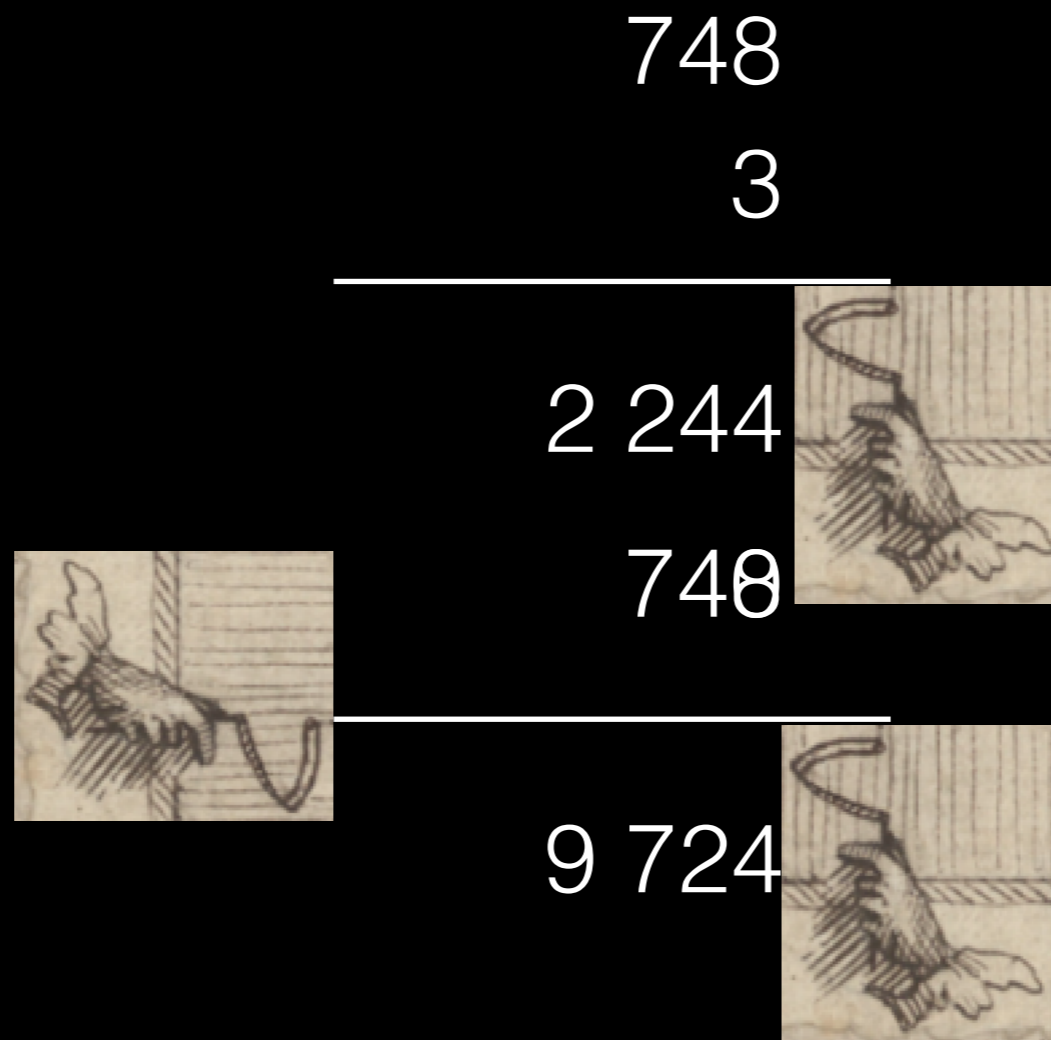
$$748 \times 13 = 9724$$

748
3

2 244

748

9 724



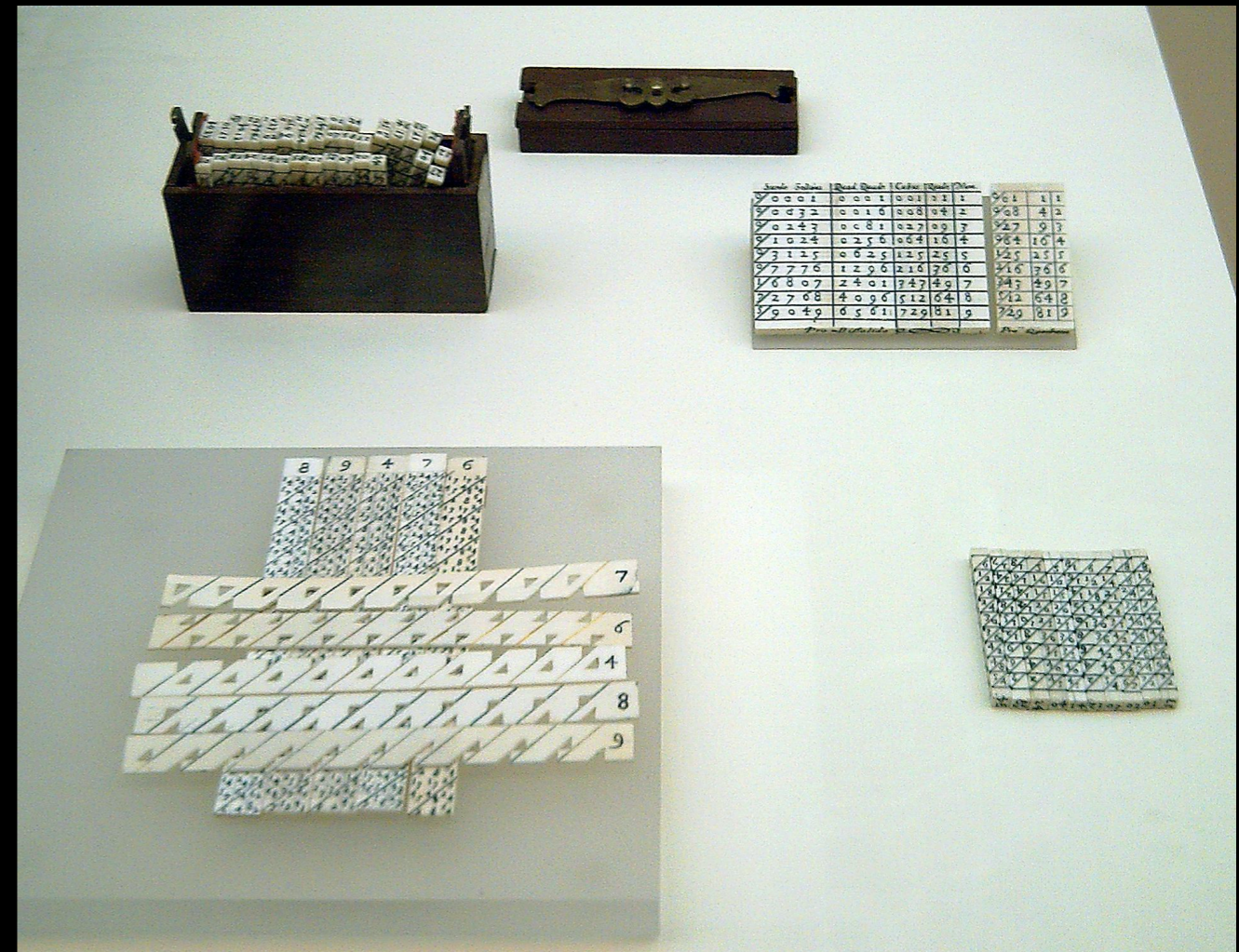
3. Re-mediating long multiplication from paper to brass and wood

$$\begin{array}{r} 23958233 \\ \times 5830 \\ \hline 00000000 \quad (= 23,958,233 \times 0) \\ 71874699 \quad (= 23,958,233 \times 30) \\ 191665864 \quad (= 23,958,233 \times 800) \\ + 119791165 \quad (= 23,958,233 \times 5,000) \\ \hline 139676498390 \quad (= 139,676,498,390) \end{array}$$

3. Re-mediating long multiplication from paper to brass and wood



Abacus



Napier's bones

3. Re-mediating long multiplication from paper to brass and wood

What is lost-in-translation and how Leibniz eschews it all

“La machine dont nous donnons icy la description exterieure, fait voir que l’esprit humain peut trouver le moyen de se transplanter de telle façon dans une matière inanimée qu’il luy donne le pouvoir, de faire bien plus qu’il n’auroit fait lui-même : pour convaincre sensiblement ceux qui ont de la difficulté à concevoir comment le Createur puisse loger une apparence d’esprit un peu plus générale dans les corps des bestes qoyque fourni de tant d’organes.” (LH XLII, 5, II, f° 33r.)

Conclusion: research threads, paper trails, and brass models

1. Further the material study of Leibniz's working papers (drawings and ekphrasis, isomorphism with long multiplication)
2. Same perspective on the many reconstructions, re-mediations, and modelisations
3. Study Leibniz's working papers for other machines (crypto, dyadic, planimeter)