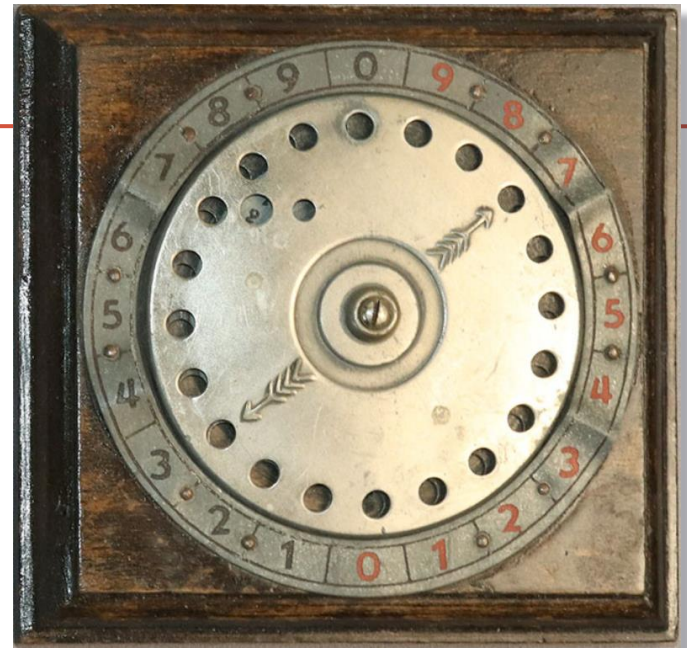


The ingenious Ifach Adder

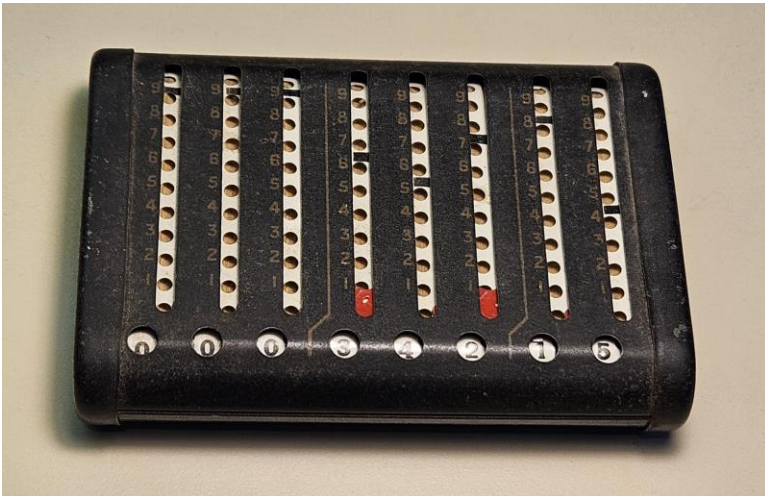
Nathan Zeldes

IM2025

Oct. 2025



You can build an adder without carry...



The inventors made high claims

BASSETT AUTOMATIC ADDER

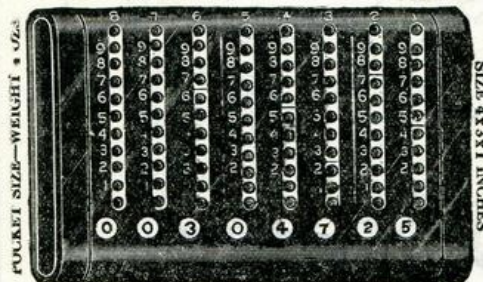
For ADDING, SUBTRACTING, MULTIPLYING

SAVES TIME AND ELIMINATES ERRORS

Makes Adding Accurate—Quick—Easy—for Everyone

Visible Totals—Capacity \$999,999.99—Durably Made

GUARANTEED ABSOLUTELY ACCURATE



**Guaranteed Fully
Against Defects**

*Quickly resets to zero
As accurate as the high
est priced machines*

No Levers to Pull

No Keys to Punch

THE LOCKE ADDER

Only

\$5

*Buy a
Locke Adder
to save your brain*

CAPACITY 999,999,999

Fastest, simplest, handiest, most practical and durable, low-priced calculating machine. Adds, Subtracts, Multiplies, Divides. **Cannot** make mistakes. Computes nine columns simultaneously. Saves time, labor, brain, and will last a lifetime.

"One should be in every business office."—Joe Lee Jameson, State Revenue Agent, Austin, Texas.

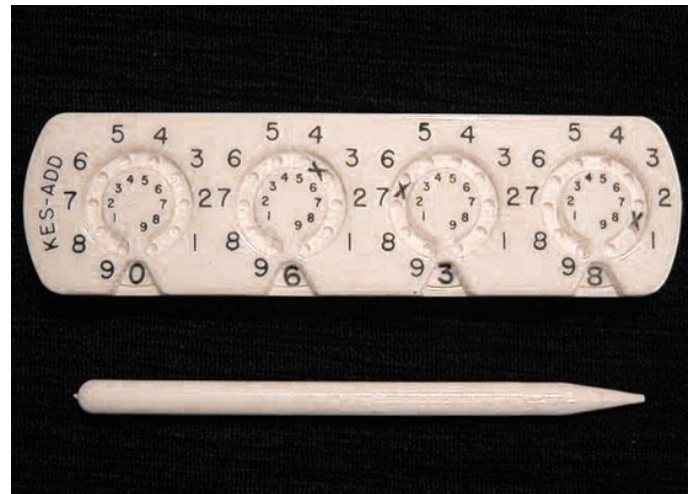
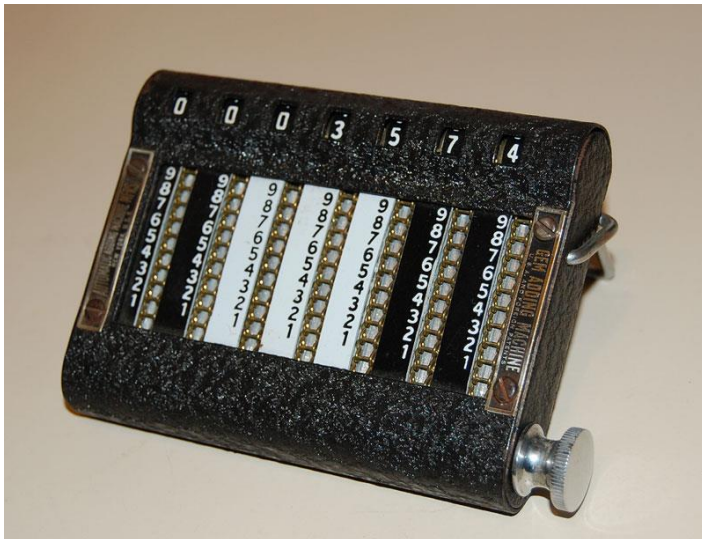
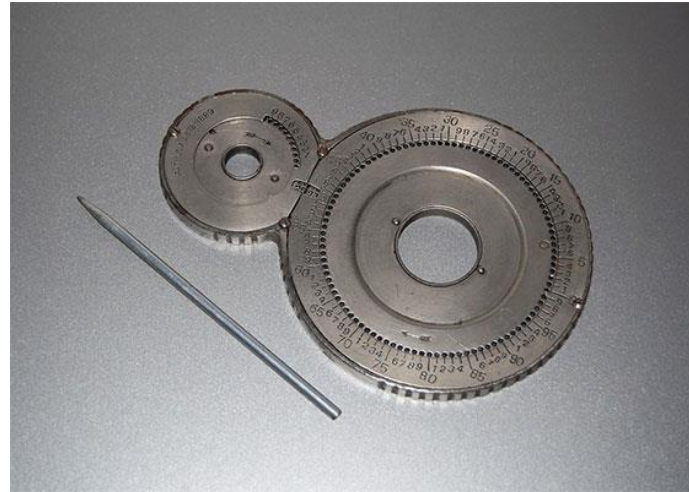
"It is worth its weight in gold."—Chas. W. Thompson, Spec'l Agt. U. S. Dept. of Labor, Boston, Mass.

Price \$5.00, prepaid in U.S. Booklet free. Agents wanted.

C. E. LOCKE M'FG CO., 64 Walnut St., Kensett, Iowa

But in reality these were extremely limited devices, because...

Carry is what makes a real adder!



Carry is a delightful mechanism

“I have recently... constructed a machine... which immediately 'automatically' reckons up, adds, subtracts, multiplies and divides given numbers.

“**You would laugh aloud** were you there and could see how it increases the digits on the left **quite by itself** when it carries the tens or hundreds.”

– *Wilhelm Schickard to Johannes Kepler, 1623*



Well, not everyone was delighted

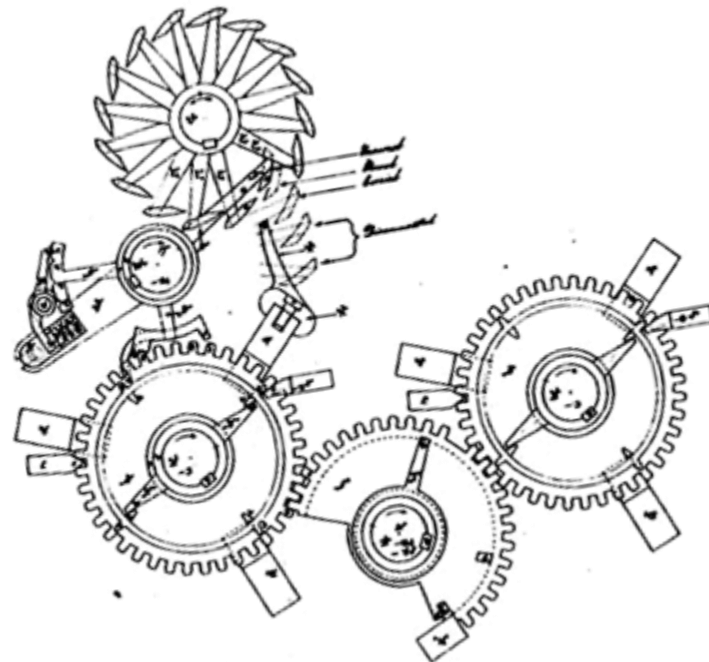
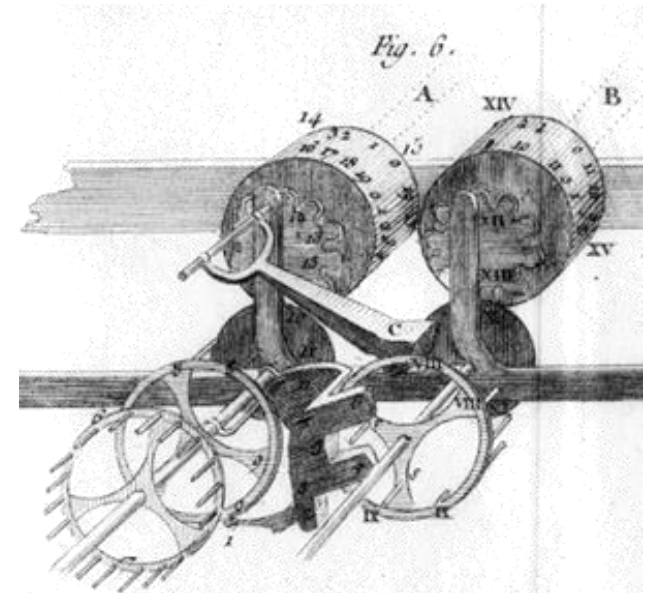
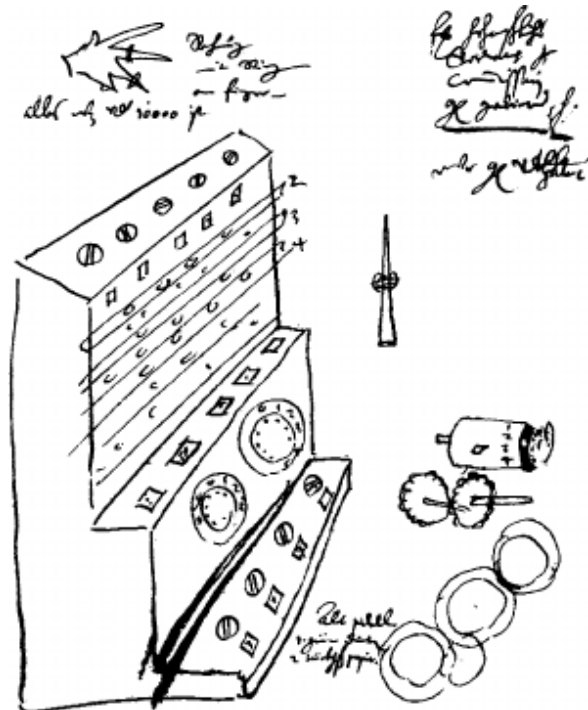
“It is not becoming in a professor of mathematics to be childishly gleeful over some method of curtailing calculation!”

– *Michael Mästlin,*
Kepler's mentor



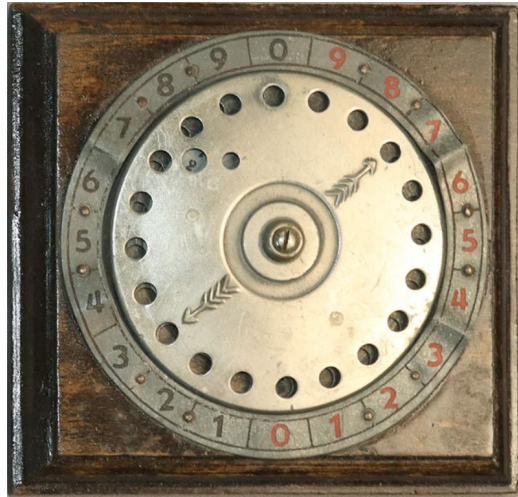
Carry means gears!

Everybody knows that...

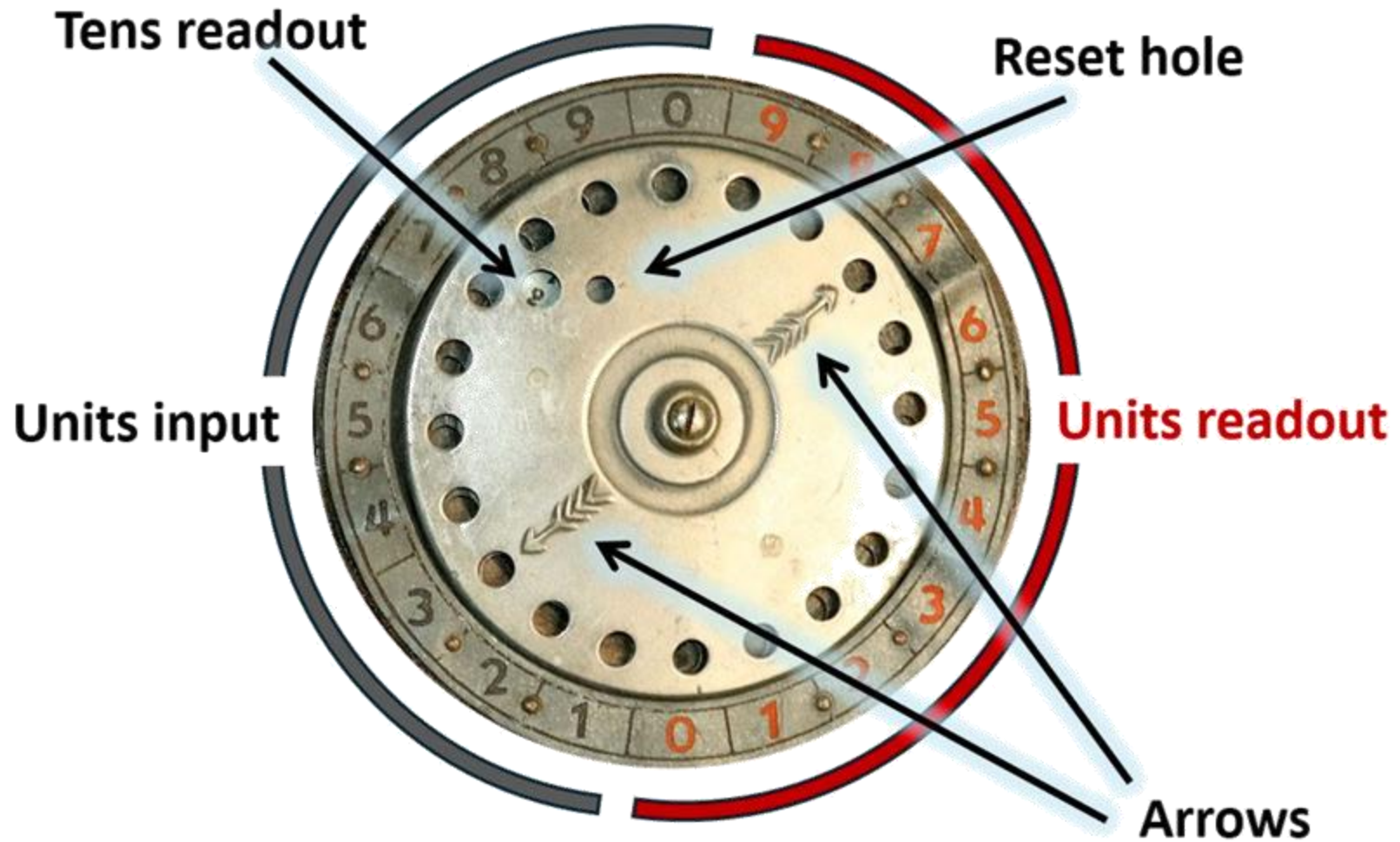


But Genaro Calatayud disagreed...

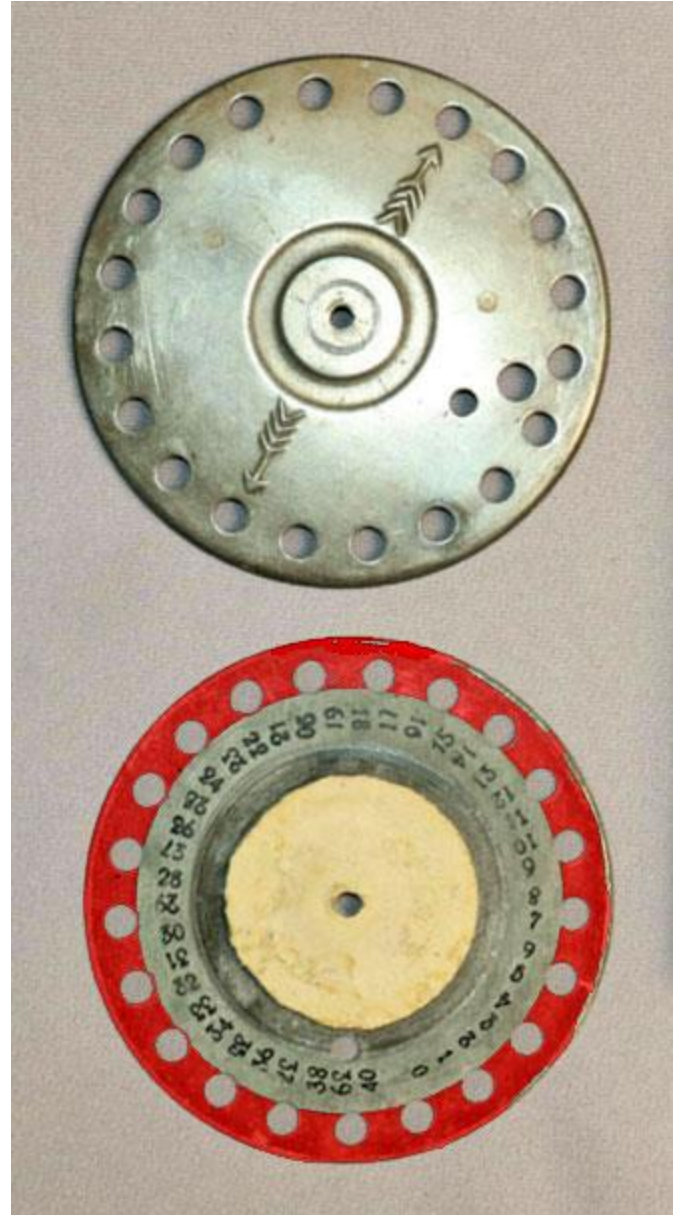
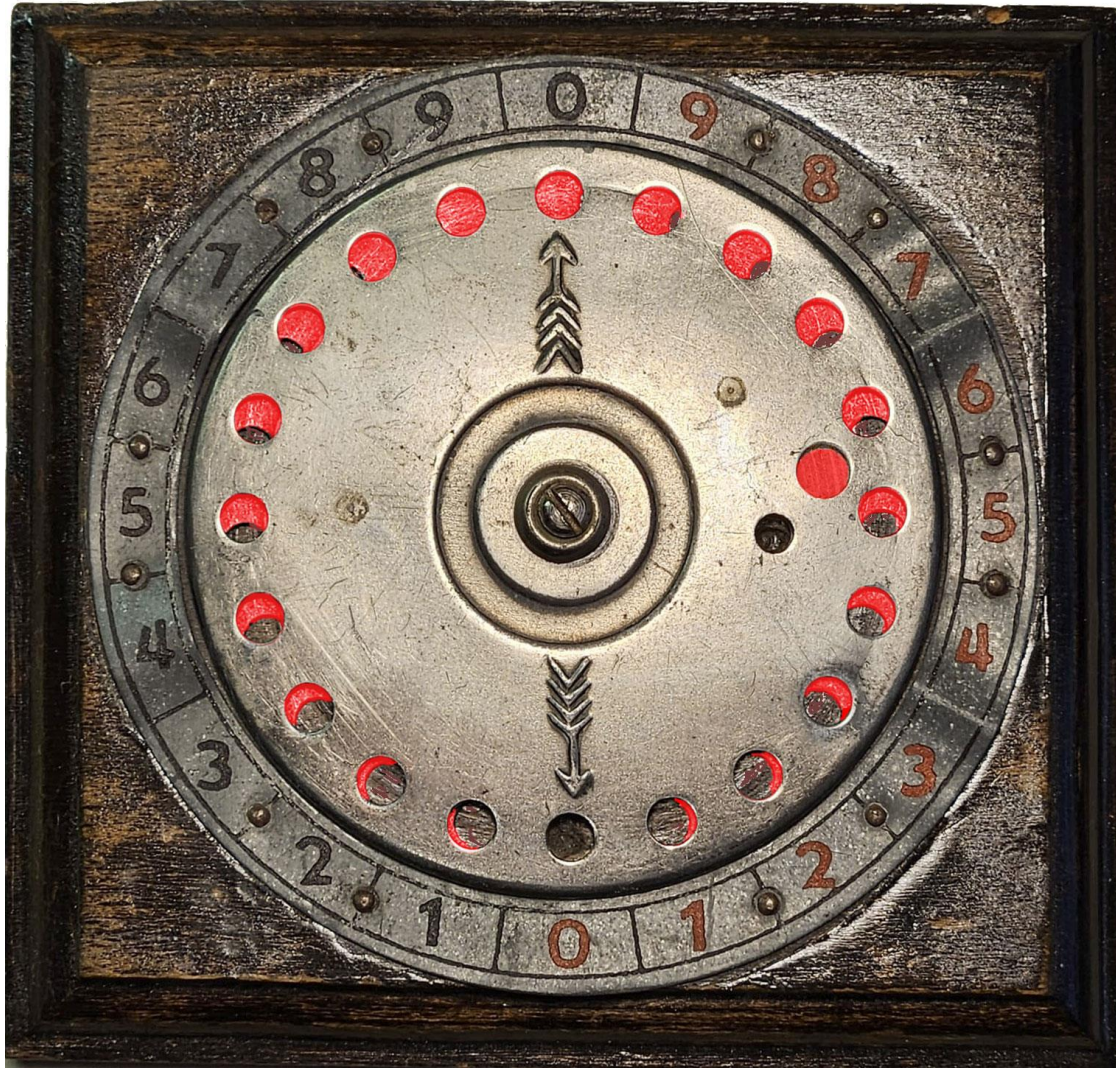
His adder has Carry, and no gears whatsoever



Structure

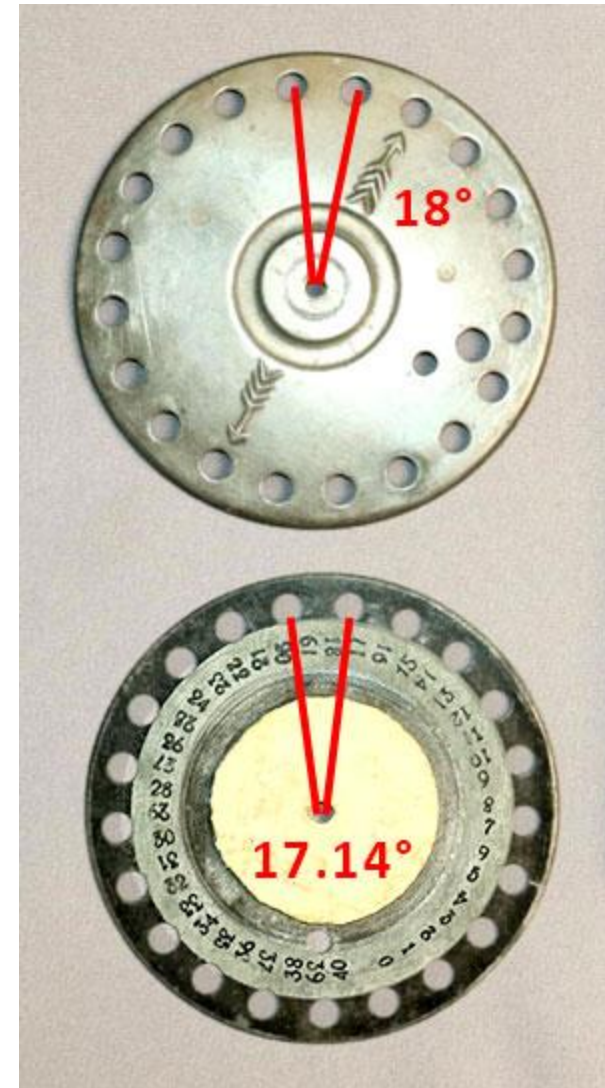


More than meets the eye



Let's do the math

- **There are 42 numbers on the bottom disc**
 - Each number spans some 8.6° ($360/42$)
- **When you increment the top disc by one:**
 - Top disc turns 18° ($360/20$)
 - the bottom disc turns 17.14° ($360/21$), because the stylus drags the top hole a bit before it engages the edge of the misaligned bottom hole
 - By the time the top disc has moved 10 units (180°) the bottom one moves 171.4°
- **This lag of 8.6°** mean that the bit of lower disc visible through the tens display window has shifted just enough to expose the next number
- **The math all works out!**

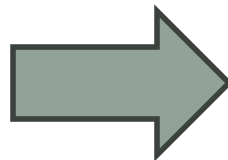
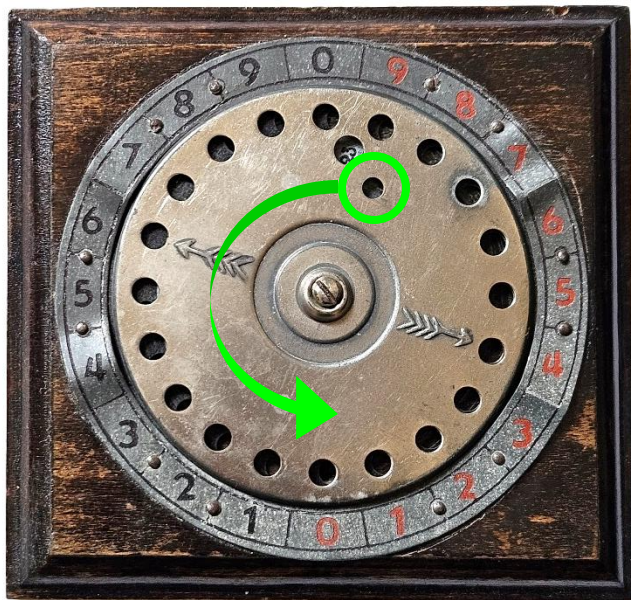


Calculation example

$$7 + 8 = ?$$

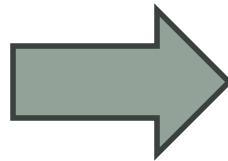
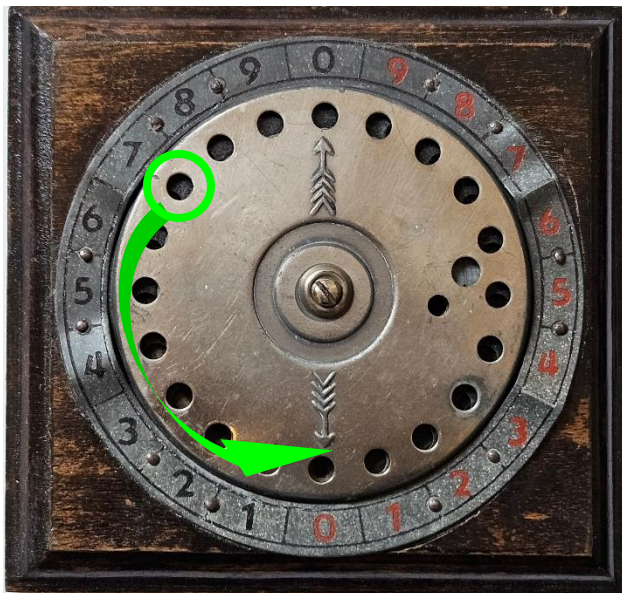
Step 1: Clear the adder

Clear the adder by sticking the stylus in the small reset hole in the top disc and rotating the disc counterclockwise until it stops.



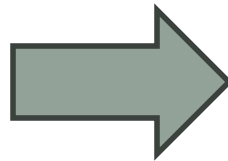
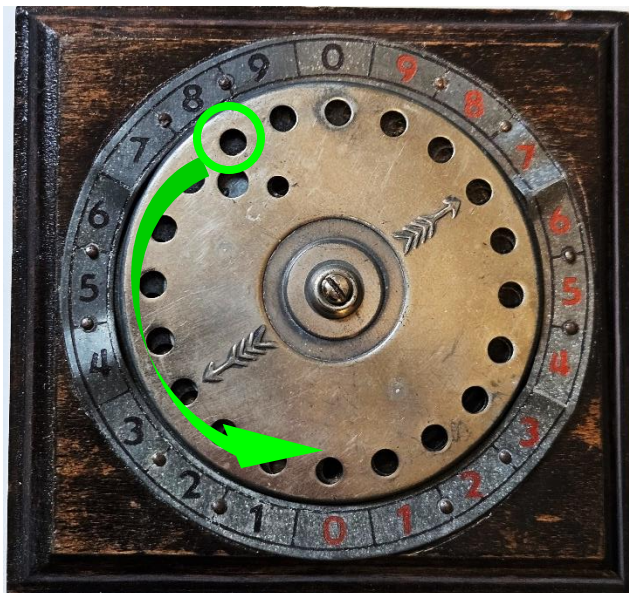
Step 2: Enter the first number

Dial in the first number to be summed (7): stick the stylus in the hole next to it in the input scale (the black numbers on the left side of the device), and turn counterclockwise until it stops.



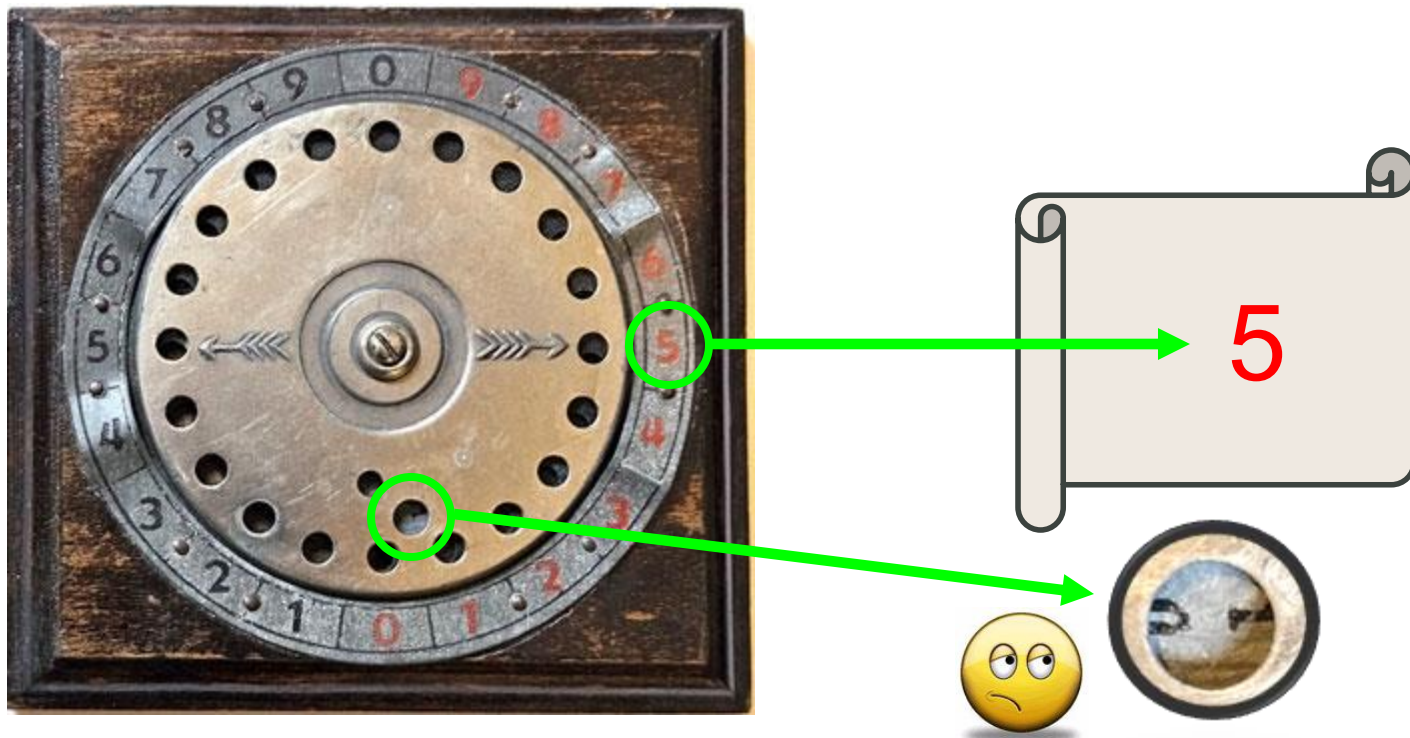
Step 3: Add more number(s)

Repeat step 2 for each additional numbers to be summed (8)



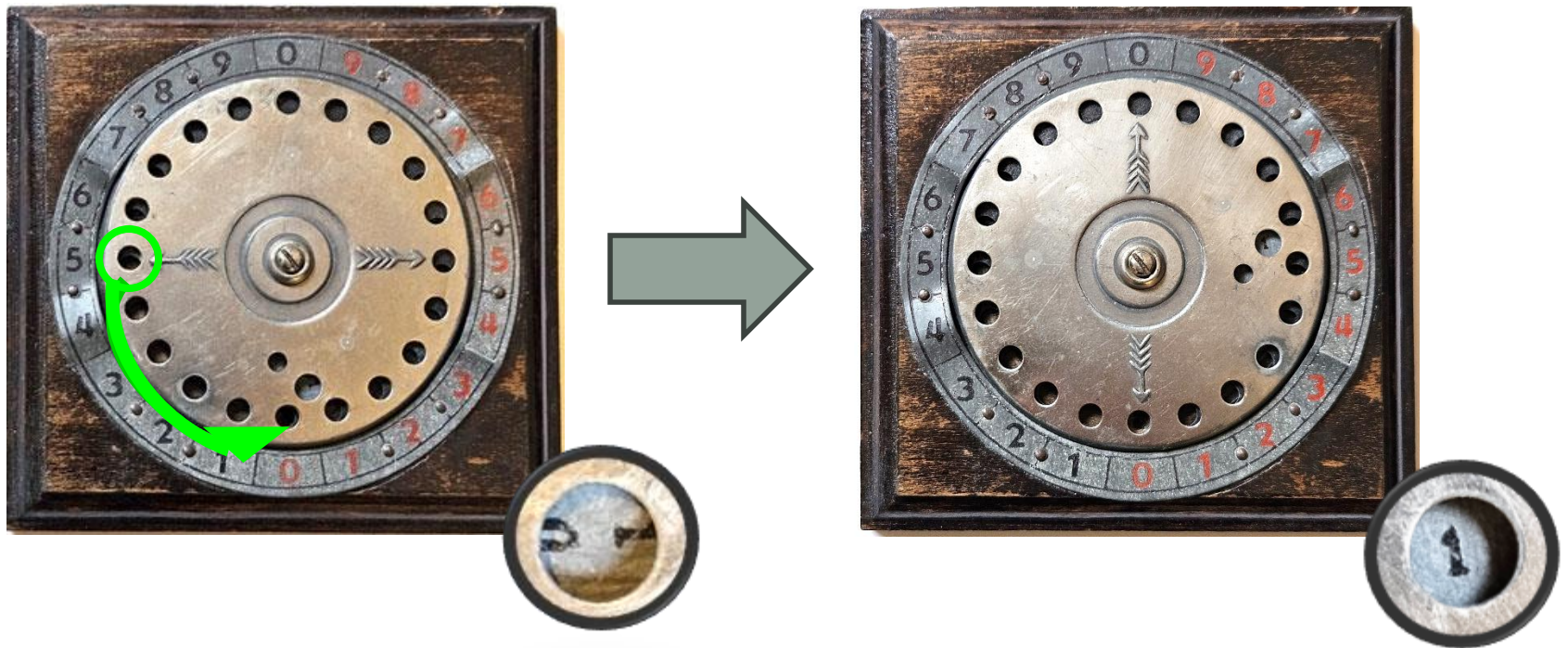
Step 4: retrieve the units digit of the result

Read and note the units digit of the result, pointed at by the arrow on the red units readout scale to the right.



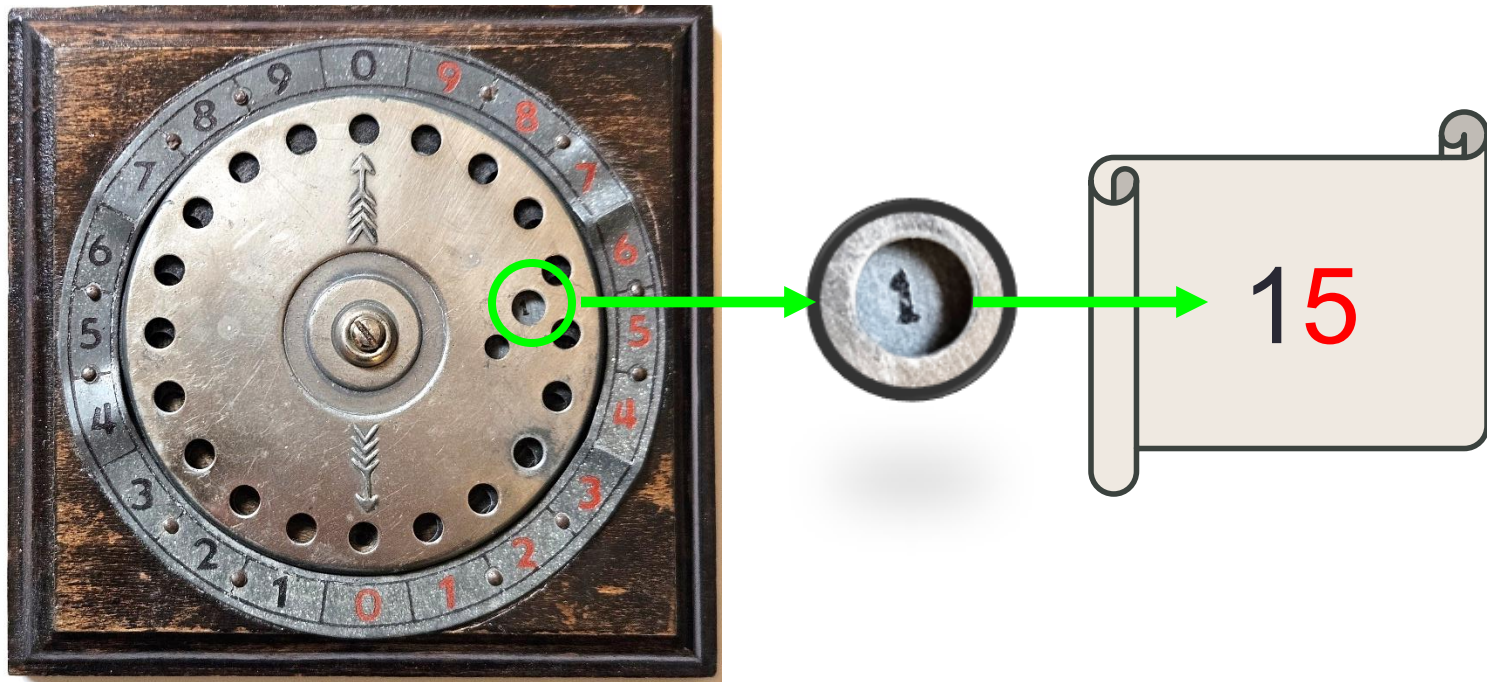
Step 5: Clean up the tens readout

Insert the stylus at the hole next to the other arrow on the black scale and turn it counterclockwise to the stop at 6 o'clock



Step 6: retrieve the tens digit of the result

Now read the tens digit(s) of the result (a value from 0 to 40) in the tens readout.



Some context

- Patented in 1943 by Genaro Calatayud Sanjuán, a pharmacist from Calpe, Alicante, Spain
- Calatayud also invented the Hogar typewriter
- Both were made locally in the small workshop of Matías Pastor Ivars
- Both use readily available or recycled materials, given post-civil-war shortages



And here is the inventor himself!



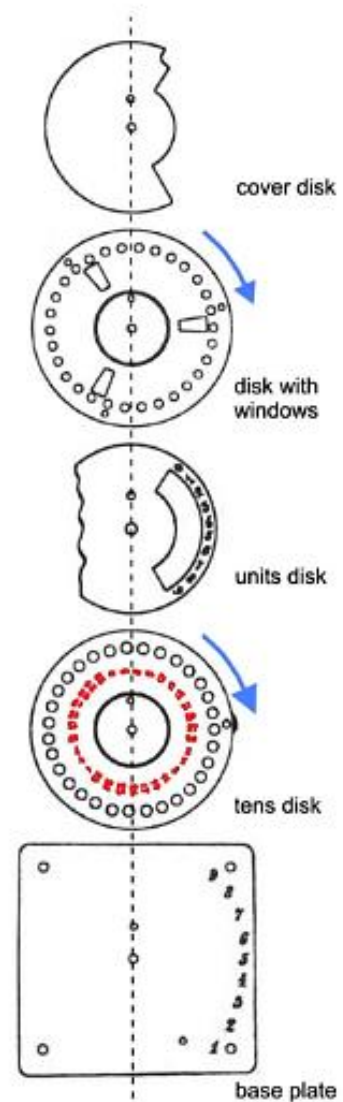
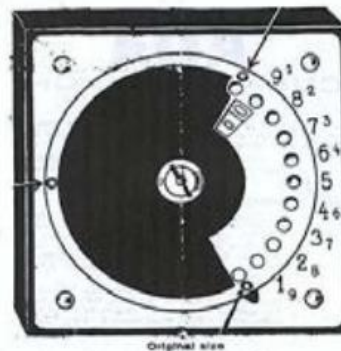
Oh, and the name:



The Rock of Ifach, Calpe, Spain

A similar device

- Josef Funke patented a somewhat more complicated adder with a similar carry mechanism in 1920
- See Stephan Weiss's paper in JOS 21.2, Fall 2012
- We have no indication whether there was a link between the two inventions



Thank you

For the instruction manual see
<https://nzeldes.com/article/ifach/>