H. Kummer,

Calculator.

No. 90,275. Patented May 18. 1869.

Fig. 1.

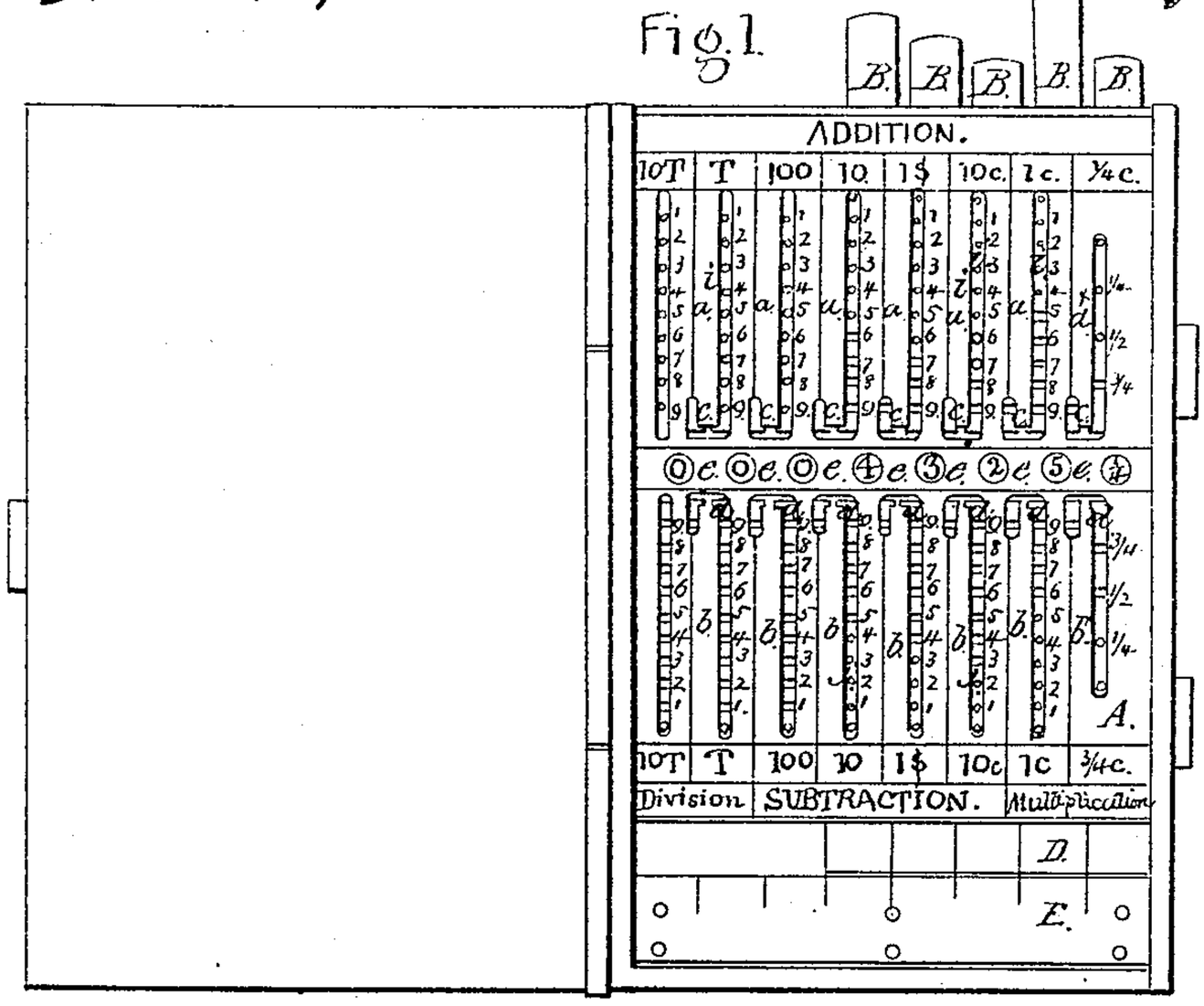
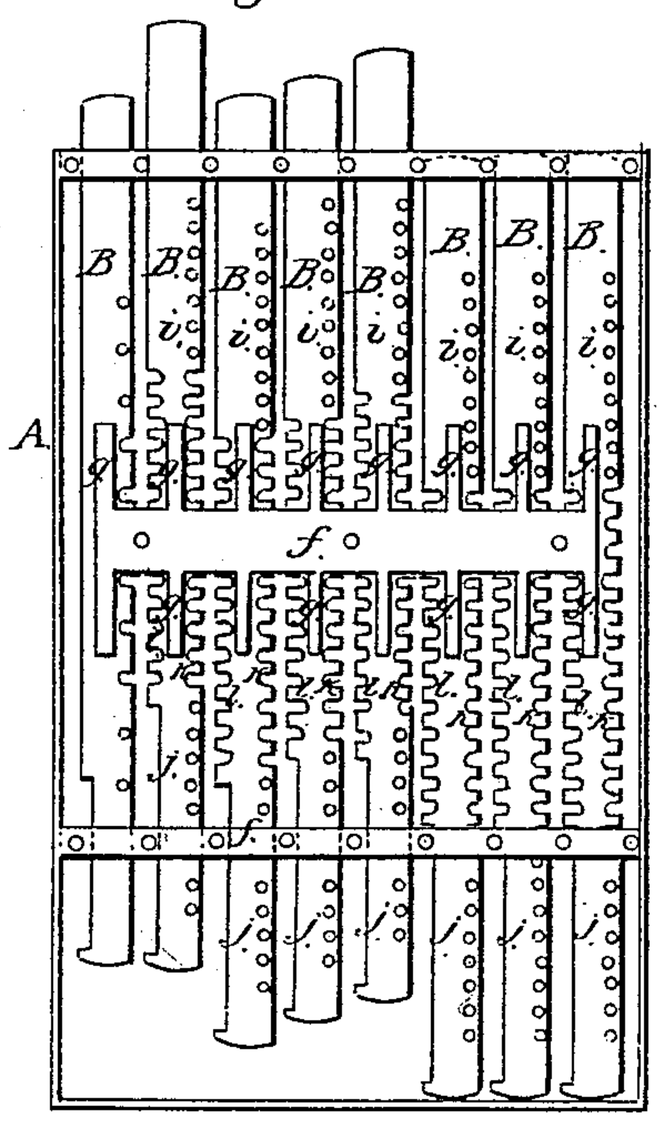


Fig. 2.



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HENRY KUMMER, OF NEW YORK, N. Y.

Letters Patent No. 90,275, *dated May* 18, 1869.

IMPROVEMENT IN COMPUTING-TABLET.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, HENRY KUMMER, of the city, county, and State of New York, have invented a new and improved Calculating-Machine; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing, forming part of this specification, in which drawing—

Figure 1 represents a front view of this invention.

Figure 2 is a rear view thereof.

Similar letters indicate corresponding parts.

This invention relates to a machine, by means of which additions and subtractions can be executed with great rapidity and exactness, and which also facilitates the operations of multiplication and division.

It is constructed on the principle of the adding-machine, described in Letters Patent granted to Samuel S. Young, July 24, 1849, being composed of a flat slotted tablet, numbered with several rows of figures, and provided with a series of slides, by the aid of which the calculating-operations are effected.

My invention consists in the arrangement of what I term "carrying-angles" in the tablet, and of open slots in the edges of the slides, in addition to the holes in said slides, in such a manner, that by means of said carrying-angles and open slots, the pin, which serves to operate the slides, can be readily passed from one slide to the adjoining one, without withdrawing its point, and thereby the operation of "carrying" a figure from one slide to the next is materially facilitated, and can, in many cases, be performed without withdrawing the pin from the slides.

The tablet is provided with two sets of slots and carrying-angles, one set for addition and multiplication, and the other set for subtraction and division, and between the two sets of slots are apertures, or windows, through which the result of the calculation can be read off.

Two transverse slides, near the bottom edge of the tablet, are used in addition to the longitudinal slides, for the purpose of executing multiplications and divisions.

A represents a tablet, made of sheet-metal, or any other suitable material, and provided with two sets of slots, *a b*, one set, *a*, of which starts at or near the top edge of the tablet, and terminates in "carrying-angles" *c*, somewhat above the middle of said tablet, while the other set of slots, *b*, starts at the lower part of the tablet, and terminates somewhat below its middle, in the "carrying-angles" *d*.

The upper set of slots serves for executing additions and multiplications, and the lower set for executing subtractions and divisions, the result in either case being read off through apertures, or windows *e*, between the upper and the lower "carrying-angles."

On the sides of the slots are marked the figures 1, 2, 3, 4, 5, 6, 7, 8, 9, one above the other, as shown in fig. 1 of the drawing, the figures on the upper slots *a* running from top down, and those on the lower slots *b* from the bottom up.

There are two slots, *a* b**, shorter than the rest, and on the sides of these slots are marked the fractions $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{4}$, or any other convenient series of fractions.

To the under surface of the tablet A are fitted a series of slides, B, equal in number to the slots *a*, and extending throughout the entire length of the tablet, under the slots *a* and *b*, as shown in fig. 2 of the drawing.

These slides are held in position by suitable traverses *f*, attached to the under surface of the tablet, and they are prevented from moving spontaneously by friction-springs *g*.

Each slide is provided with nine holes, *i*, commencing near its upper end, and corresponding in position (when the slide is pushed home) to the figures 1, 2, 3, 4, 5, 6, 7, 8, 9, on the slots *a*, and it is also provided with nine similar holes, *j*, commencing near its bottom end, and corresponding in position (when the slide is drawn out) to the figures 1, 2, 3, 4, 5, 6, 7, 8, 9, on the slots *b*.

The space between the two sets of holes on each slide is occupied by open slots *k*, and when one of the slides is drawn out, said open slots may take the places of the holes, corresponding in position to the figures on the sides of the slots *a* and *b*.

That portion of each slide which is occupied by the open slots *k* is increased in width, so that the edges of said wide portions of the several slides are close together, (see fig. 2,) and each slide is provided with a series of open slots, *l*, on that edge which is opposite to the open slots *k*, each of said open slots *l* being exactly opposite to one of the open slots, *k*.

The slide B*, under the fraction-slots *a* b**, is constructed similar to the slides B, with the exception that the number of holes therein is confined to the number of fractions placed on the sides of said slots, and the number and position of the open slots between said holes are controlled by the number and position of the holes.

In using my calculator for executing an addition or subtraction, I proceed as follows:

The slots *a* and *b* may represent units, tens, hundreds, &c., or they may represent 1c., 10c., $1, $10, &c., as indicated by the figures on the ends of said slots.

In adding up the following example:

$$\begin{array}{r} \$27\ 30\frac{3}{4} \\ 8\ 94\frac{1}{2} \\ 7 \end{array}$$

I proceed as follows: The slides are first set to their starting-points. I then take a pointed piece of wire,

or other material, and insert it into the hole opposite the figure ¾, on the fraction-slide, and carry said slide up, until the pin strikes the upper end of the slot. Then insert the pin into the hole opposite the figure 3, on the 10c. slide, and move that slide. Then do the same on the $1 and $10 slide, and by these means the figure 27 30¾ will appear in the windows. Next insert the pin into the slot opposite the ½, on the fraction-slide, and carry this slide down, the rule being that the slide is carried up when a hole is opposite the figure to be added, and down when an open slot is opposite said figure, and in this latter case "one" has to be carried on the next adjoining slide.

This purpose is effected by carrying the fraction-slide down, until the pin strikes the bottom end of the slot, and then moving the pin sideways into the "carrying-angle," and up until it strikes the upper end of said angle. The fraction-window then shows ¼, and the 1c. window a 1. Next take the 4, on the 1c. slide; then the 9, on the 10c. slide, carrying "one" to the $1 slide; then the 8, on the $1 slide, carrying "one" to the $10 slide, whereby the windows are made to exhibit the figure 36 25¼. Finally, add the 7, on the $1 slide, carrying "one" to the $10 slide, which gives the result, viz, 43 25¼.

In some cases, it happens that the slide on which "one" is to be carried is already clear up, (showing a 9 in its window,) and in such case such slide is brought clear down, and the "one" is carried on the succeeding slide; for instance, in adding—

999
999
———
1998

the 1c., 10c., and $1 slides are first set to show 999. By adding thereto the 9 of the second figure, the 1c. slide is carried down, and made to show 8 in its window; but in order to carry the "one," the 10c. and $1 slides have to be moved clear down, and the "one" can then be carried on the $10 slide, showing 1008 in the windows. Then the two remaining 9's are added on the 10c. and $1 slides, and the result is 1998.

In making a subtraction, the operation is as follows:

Suppose $13 87¾ are to be subtracted from $43 25¼. Set the slides so as to exhibit in the windows the last-named figure, (43 25¼,) insert the pin into the slot opposite the ¾, on the lower portion of the fraction-slide, and move upward toward the carrying-angle, and carry "one," by moving the pin into the carrying-angle, and down, so as to show ½ in the window of the fraction-slide, and 4 in the window of the 1c. slide. Then insert the pin into the slot opposite the 7, on the 1c. slide, move up toward the carrying-angle, and carry "one," on the 10c. slide, making the figure in the windows 43 17½. Then insert your pin in the slot opposite the 8, on the 10c. slide; move up and carry "one" on the $1 slide, making the figure in the windows 42 37½. Then insert your pin in the slot opposite the figure 3, on the $1 slide; move up, and carry "one" on the $10 slide, making the figure in the windows 39 37½; and, finally, insert your pin into the hole opposite the 1, on the $10 slide, and move down, making the result of the operation 29 37½.

This operation is carried on on the lower, or subtraction-half of the tablet, and whenever the figure to be subtracted stands opposite a hole on its slide, said slide is moved down, and when it stands opposite to an open slot, the slide is moved up, and "one" is carried on the succeeding slide, by moving the pin into the carrying-angle, and down therein, until it strikes the bottom thereof.

The multiplication and division are carried on by means of the transverse slide D, and strip E, at the bottom of the tablet A.

If it is desired to multiply 54 by 32, the multiplicand, 54, is written on the slide D, so that the 5 is under the 10c. slide, and the 4 under the 1c. slide. The multiplier, 32, is then written on strip E, bringing the 3 under the 5, and the 2 under the 4. Then proceed as follows: 2 times 4 make 8, which indicate on the 1c. addition-slide; 2 times 5 are 10, which indicate on $1 addition-slide; then move the slide D, so as to bring the 4 over the 3, and proceed in the same manner, 3 times 4 are 12, which mark on the 10c. and $1 slides; 3 times 5 are 15, which mark on the $1 and $10 slide, and the result, 1728, will appear in the windows.

In making a division, the subtraction-slides come into use. If, for instance, 228 are to be divided by 12, I set the slides so that the windows show the dividend, 228. Then I move the slide D under the word "division," on the tablet, and write thereon the divisor, 12, under the 100 and $10 slides, which show the 22. Then proceed as follows: 12 is contained in 22 once; mark 1 on the strip E, and subtract 12 from 22 by moving the proper subtraction-slides, which leaves in the windows the figure 108; 12 in 108, 9 times; write 9 on the strip E, under the 2 of the divisor; 9 times 12 are 108; subtract 108 from 108, which leaves nothing in the windows of the tablet.

From these examples, it will be readily understood how my calculating-machine is to be used, and its great advantage particularly in adding long rows of figures will be readily appreciated.

I disclaim everything shown and described in the patent granted to Samuel S. Young, July 24, 1849; but

Having thus described my invention,

What I claim as new, and desire to secure by Letters Patent, is—

1. The carrying-angles *c d*, in combination with the slots *a b*, in the tablet A, and with the slides B, substantially as set forth.

2. The arrangement of open slots *k* and holes *i j*, in the slides B, as described.

3. The arrangement of open slots *l* in the slides opposite the open slots *k* therein, substantially in the manner set forth.

HENRY KUMMER.

Witnesses:
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C. WAHLERS.