W. M. HAINES.

Calculator.

No 6,403.

Patented May 1, 1849.

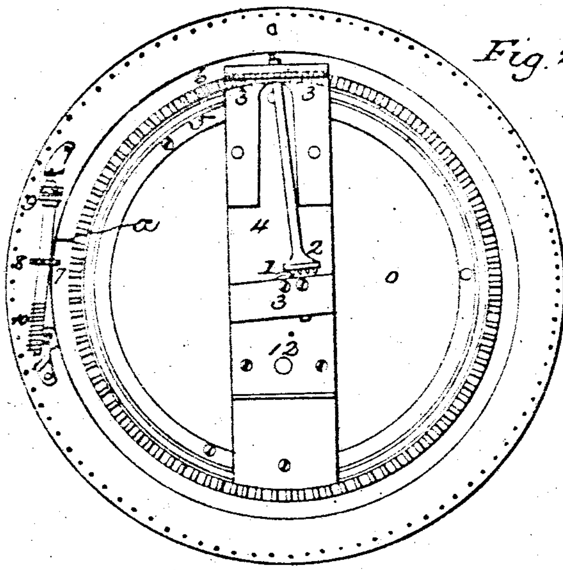


Fig. 2.

Fig. 3.

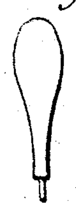


Fig. 1.

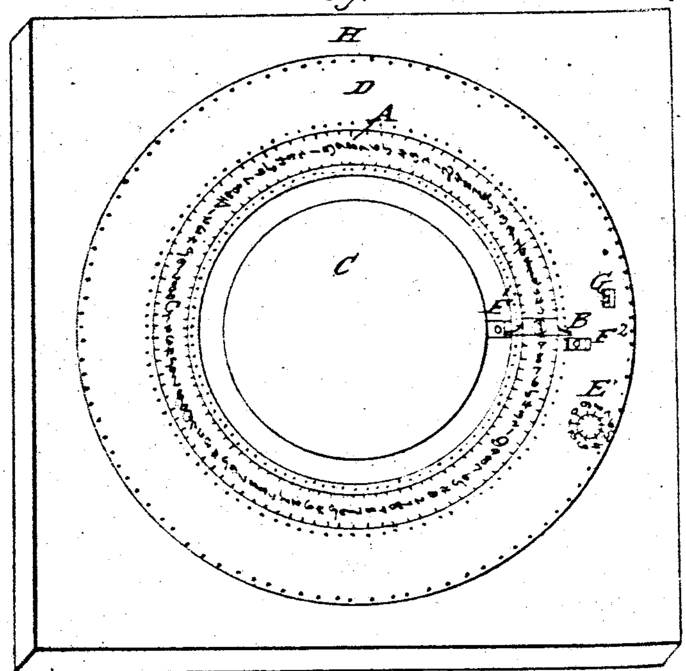


Fig. 4.

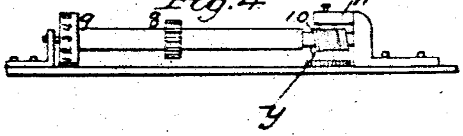
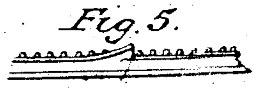


Fig. 5.



N. PETERS, Photo-Lithographer, Washington, D.C.

UNITED STATES PATENT OFFICE.

WM. M. HAINES, OF ROCHESTER, NEW YORK.

CALCULATING-MACHINE.

Specification of Letters Patent No. 6,403, dated May 1, 1849.

To all whom it may concern:

Be it known that I, William M. Haines, of the city of Rochester, in the county of Monroe and State of New York, have invented a new and useful improvement on a machine named a "Mechanical calculator" for adding figures of different denominations together and for subtracting one sum from another; and I hereby do declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a front perspective view; Fig. 2, an inside view, showing the interior arrangement as viewed from the back part, with the stock off. Fig. 3 is a pin for operating the machine, and Fig. 4 is a side elevation of the carrying apparatus attached to the outer circle. Fig. 5 is a side elevation of the bevel plane.

Explanation of Fig. 1.—A is a slightly elevated stationary circle or ring, having a hundred figures on it, from 1 to 9. It is divided into ten parts by larger figures than the others, thus 1, 2, 3, 4, 5, 6, 7, 8, 9, representing 10, 20, 30, 40, 50, 60, 70, 80, 90, the small figures representing the numbers between them. B, is a small piece of steel screwed to the circle A, for a rest or stopping point. C, is the inner circle running under the inner edge of circle A, and is movable having a hundred small circular holes equal distances apart for moving it by the pin correctly. D, is the outer circle, also movable and has a hundred holes like the inner circle and for the same purpose, and runs under the outer edge of circle A. E, is a minor index circle, numbered from 0 to 9. F, F, are two square holes for the purpose of perceiving figures on two under circles, which are beneath the inner and outer movable circles, C. D, G, the small square hole near the edge of the outer circle, is for the purpose of perceiving numbers on a small roller under it, and also to allow the roller room to revolve. The two circles seen through the square holes F, F, are numbered from 0, to 99. The way to use the machine is as follows, first bring the square hole F, of the inner circle to the rest B, and you will see a 0 under it on the wider circle. Bring the outside square hole F, round until 0, is seen in it also, and be sure to have the 0, on the roller which is marked from 0, to 9, looking through at G. A few turns of the outer circle D, will show how these things are done. Having a cipher looking through all the square holes F, F, and G, put a small pin in the minor circle E, in the hole opposite 0, and the machine is ready for operation as follows. Example, find the sum total of

8,743
5,631

Put the pin Fig. 3 in the small round hole in the circle D, or outer circle opposite 87 on the stationary circle A, and turn it round to the right against the rest B, then put the pin in the hole of the inner circle C, opposite 43 on the stationary circle A, and bring it round to the rest in the same manner as the other (the holes on the extreme edge of the outer circle D, are not used). Looking through the square holes F, F, you will perceive the number 87 in the square hole F, of circle D, and 43 in F, of the inner circle—thus 8743—the first sum of the example. Now to this sum you have just got to add the next, to bring out the total amount. Now put the pin in the small hole of the outer circle D, opposite 56 on the stationary circle A, and bring it round to the right against the rest. Now do the same with the inner circle, putting the pin in the hole opposite 31 on the circle A. Now look through the square hole G, and you will see one (1) on the roller. In the outer square hole F, you will see 43, in the inner F, 74 or 14374 the sum total of the problem. It will easily be seen that this method of calculation can be carried out to a great extent, while by carrying the circle round to the left, subtraction from the same seen on the roller and in the holes will be the result. The minor index circle E, is for measuring the calcula of hundreds of thousands. The revolving roller seen at G, is for measuring tens of thousands and the outer F, hundreds and thousands, the inner F, units and tens. To add dollars and cents, for dollars, find the hole in the outer circle opposite the number on the stationary circle A, and carry it around as shown by the example. Only use the inner circle for cents and the outer circle for dollars, and the roller and minor index E, will show the extended amount. By reversing the operation, you can subtract and keep up an account, by adding for debit and subtracting for credit.

The following column of figures will show the operation of the whole parts of the machine. Commence with the numbers as shown by the example and continue the process until all the figures are added, when if you look at the minor index E, you will perceive the small pin a little past figure 1. On the roller G, you will see 4. In the outer square hole F, you will see 58. On the inner F, 92 or 145892, the sum total of the problem:

87	43
56	31
47	98
92	76
73	54
43	20
65	79
98	64
85	43
54	32
78	53
65	47
32	29
96	31
87	43
46	91
85	95
79	43
86	56
94	64
1458	92

H is merely the stock in which the machine is fixed a piece of wood hollowed out to let the Fig. 2 operate easily.

Description of Fig. 2.—O, is the stationary inside figure circle seen through the inner square hole F′, Fig. 1, and 1, is an axle fastened to circle C, Fig. 1, and moved by it. On this axle is a screw which moves the pinion 2 one notch by every revolution of circle C, Fig. 1, 3, and 3, 3, are flange rests, made by the broad brass plate 4, to serve as gudgeons to the axle 1, and shaft of pinion 2. These rests are doubled over deep enough to allow a small ratchet wheel fixed on the pinion shaft to move free under 3, 3, indicated by red lines. 5, is a slightly elevated rim being the under side of circle A, Fig. 1, to keep up the flange plate 4, so as to allow the ratchet circle (which is the outer figure circle seen through the outer square hole F, Fig. 1,) to be moved by the small wheel under 3, 3, which bites on the notches of the circle. 7, is a small bevel plane (with a slight abrupt elevation at +) fixed on circle 6, or ratchet circle, which moves the pinion 8, one notch for every revolution of circle 6, or circle D, only in the later case, the pinion moves on the bevel plane instead of the plane on the pinion. 9, is a figure roller numbered from 0, to 9. 10, is an endless screw on the shaft of the pinion 8, which moving in unison with it, turns a small vertical wheel under rest 11 once in every revolution of the pinion, turning the small pin on the minor circle E, Fig. 1, only one tenth of the minor circle by every revolution of the pinion 8. D, is but the inside view of D, Fig. 1. 12 is a small hole for a screw to fasten the machine in its stock.

The principle upon which this machine is constructed is the simple relationship of figures in their different combinations, all sums of any amount being composed of a cipher and the nine digits in different combinations as fully shown by the example. The only apparent difficulty is the manner to carry one to the outer square hole F, Fig. 1, for every revolution of circle C, Fig. 1, but the method of doing this is simply by the axle 1, Fig. 2, being moved by circle C, Fig. 1, which moves the pinion 2, Fig. 2, one tooth for every revolution of circle C, Fig. 1, and the wheel under 3, 3, having the same number of teeth that pinion 2, has, and being connected with the same shaft, must of course turn one tooth for every revolution of circle C, and being connected by cogs with wheel O, must move that one cog for every revolution of circle C, and wheel O, having 100 cogs and also 100 numbers, must be turned one number for every revolution of circle C, and these are the numbers seen through the outer square holes F, thus showing the use of the axle and pinion and all the various parts in harmonious combination.

The circles should be made of brass $\frac{1}{16}$ part of an inch thick, or of some other suitable substance. The inner circle C, Fig. 1, is made of solid brass $\frac{1}{16}$ of an inch thick, having only a small square hole F, and 100 circular holes in the edge. O the fixed circle Fig. 2, is the under figure circle of C, Fig. 1, and is made of the same metal as C, Fig. 1 (it may all be made of brass) only it has a hole in the center for the axle 1, which is fastened to C, Fig. 1, to move free through it. A, the stationary circle Fig. 1, may be made deep—thick enough to answer the purpose of rim 5, Fig. 2, in the sides of which are small anti-friction rollers to let the ratchet circle 6, and circle D, move around easily. The flange rests can be made in any manner so as to allow the axle and pinion and ratchet wheel under 3, 3 to move easy and correct. The axle 1, fixed on C, Fig. 1 must have the screw cut to move only one tooth of the pinion 2, by every revolution of circle C, Fig. 1, and by this first arrangement, all the rest of the parts move correctly. The bevel plane 7, moves pinion 8 one notch in every revolution of circle 6, by the pinion bearing on the edge of circle 6. So that when the circle is moved to the right and pinion 8 comes to the bevel 7, pinion 8 is moved one notch and the roller 9, is turned one-tenth, and the wheel Y Fig. 4 is moved by the screw 10, one-hundredth part of the minor circle E, Fig. 1. The screw pinion 8 may be fixed in any manner upon rests, so as to allow the roller and wheel free and correct motion, and there must be ten teeth on pinion 8, and also on the wheel Y, Fig. 4 moved by screw 10, represented in Fig. 4.

This machine may be fastened in any kind of stock, so as to keep the stationary circle A, firm and to allow the circles and pinions to move free.

Having thus fully explained the use of my machine and the mode of its operation and construction, so that any mechanic by the drawings and description may construct one similar to it in all the different parts, what I claim and desire to secure by Letters Patent, is—

1. The combination of the stationary circle A, Fig. 1, with the circles C, and D, Fig. 1, and with circles O, and 6, Fig. 2, in the manner and for the purpose substantially as described.

2. I also claim the combination of the inner circle C, Fig. 1, with the ratchet circle 6, Fig. 2 in such a manner as to move circle 6, Fig. 2 one number in one direction, for every revolution of circle C, in a contrary direction, for the purpose of carrying one to the outer square hole F, for every hundred added by moving circle C. I also claim the combination of the pinion 8, with the movable circle D and the roller 9, screw 10, and wheel Y, and the bevel 7 whereby when the circle D, is moved round, the roller 9, and the minor circle plate of E, are moved also in conjunction with the circle C, for the purposes herein set forth.

I do not claim the particular mechanical devices in this machine, such as a bevel plane to turn a pinion and a screw to move a wheel, as all these have been long known, but I claim the combination in the manner specified in the above claims of the mechanical devices or their equivalents herein set forth along with the circles and circle, stationary and fixed having figures on the same to produce the arithmetical results substantially as herein described.

WILLIAM M. HAINES

Witnesses:

D. HAINES,

I. HAINES.