S. J. KELSO.

Ciphering Machine.

No. 58,347. Patented Sept. 25, 1866.

Fig. 1.

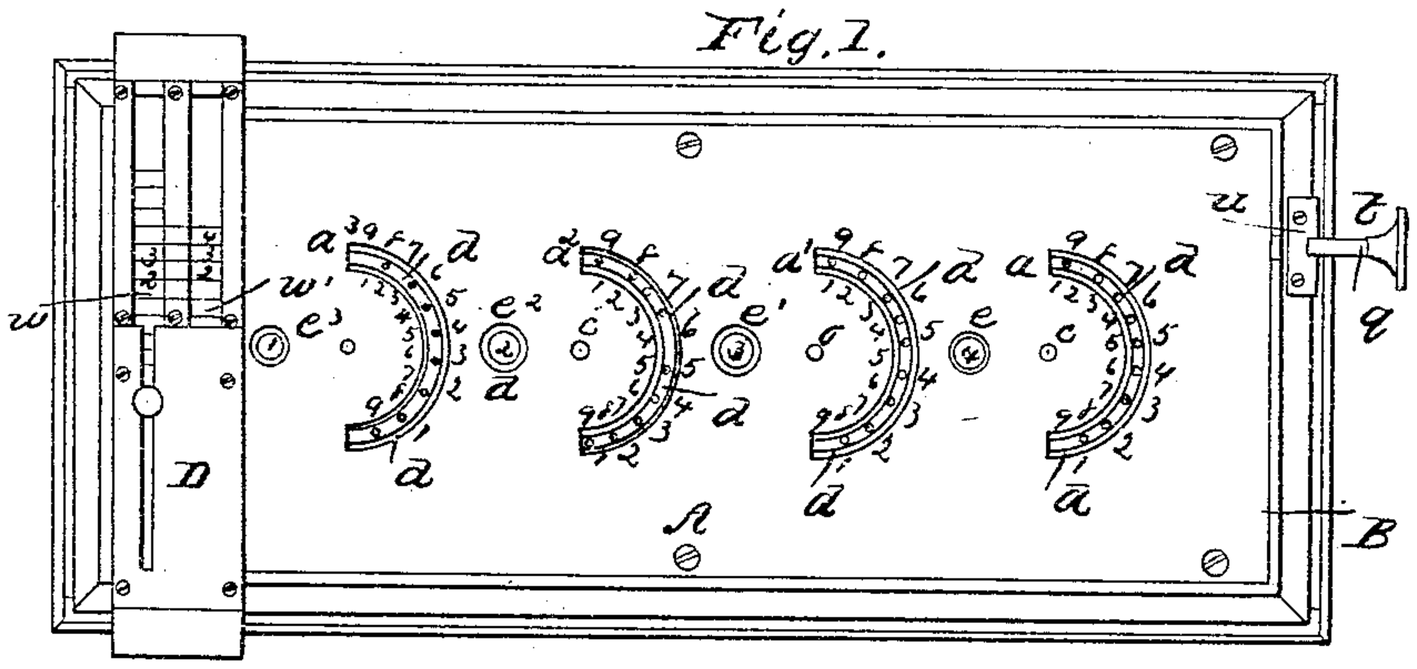


Fig. 4.

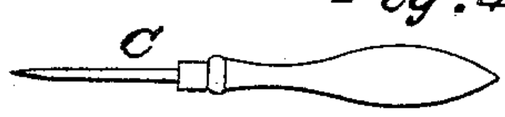


Fig. 2.

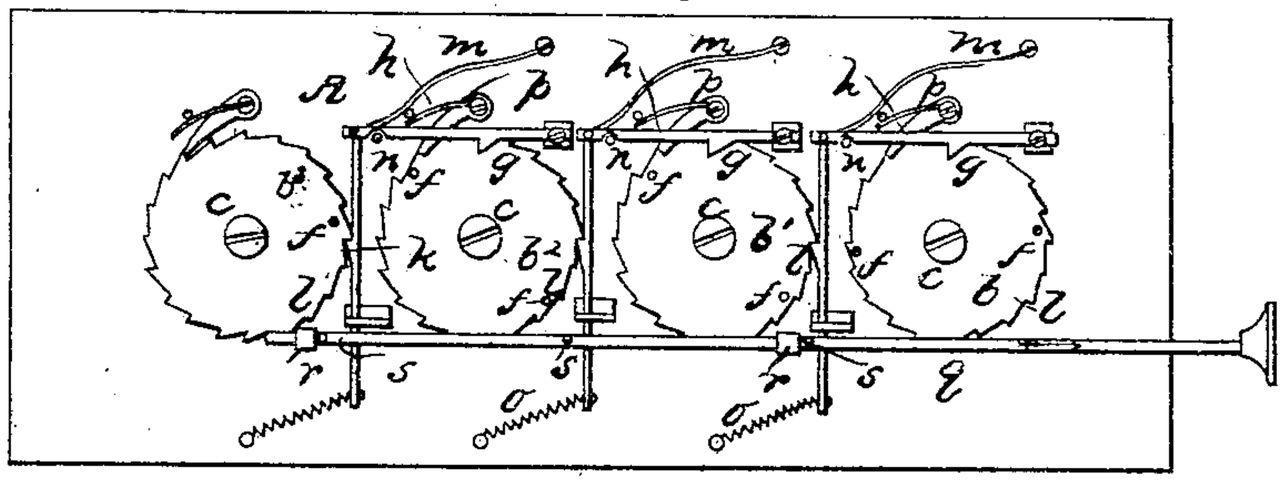
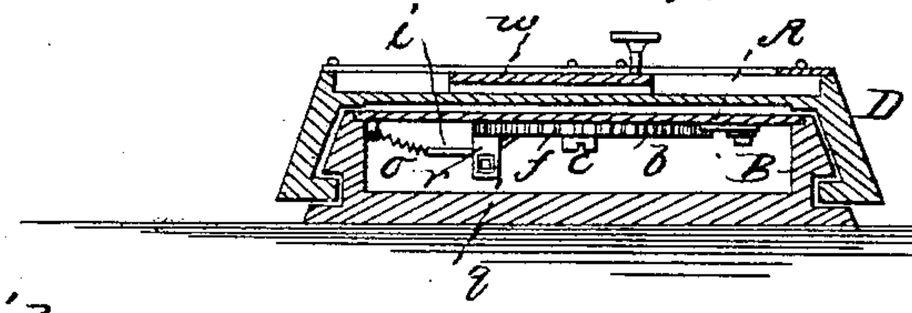


Fig. 3.



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UNITED STATES PATENT OFFICE.

SAMUEL J. KELSO, OF DETROIT, MICHIGAN, ASSIGNOR TO HIMSELF AND JAMES EDGAR, OF NEW YORK CITY.

IMPROVEMENT IN CIPHERING-MACHINES.

Specification forming part of Letters Patent No. **58,347**, dated September 25, 1866.

To all whom it may concern:

Be it known that I, SAMUEL J. KELSO, of Detroit, Wayne county, State of Michigan, have invented a new and Improved Ciphering-Machine; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents a face view of this invention. Fig. 2 is an inverted plan of the face-plate thereof. Fig. 3 is a transverse section of the same. Fig. 4 is an elevation of the pointed pen used in operating my machine.

Similar letters of reference indicate like parts.

This invention relates to a machine which can be used for adding, subtracting, and multiplying figures of any desired magnitude with the greatest ease and facility. For adding and subtracting a series of wheels are used, which revolve on suitable pins projecting from the under surface of a plate of sheet metal or other suitable material. Each of the sheets is provided with ten or a multiple of ten holes or cavities, and the face-plate is provided with semicircular slots, and with figures from 1 to 9 on the convex sides of said slots for adding, and from 9 to 1 on the concave sides for subtracting, and a suitable carrying mechanism is combined with the wheels in such a manner that whenever one of the wheels is turned for ten holes or cavities the next succeeding wheel will turn for one cavity. The carrying mechanism is composed of a series of compound pawls, each constructed of two rods, one of which is hinged to the under surface of the face-plate, and provided with a nose or cam, to be acted upon by a pin projecting from the appropriate wheel, whereas the other rod is hinged to the loose end of the first rod, and provided with a tooth, which catches in the next succeeding wheel in such a manner that whenever the pin of the first wheel passes the nose or cam of the main rod the second wheel is turned one tooth. A rod sliding in suitable sockets on the under surface of the face-plate serves to throw the carrying mechanism out of gear, so that each of the wheels can be turned independent of the others.

The multiplying device consists of a carriage, which is fitted on the case containing the adding and subtracting wheels, and the operation of this part of my invention will be explained as the description proceeds.

A represents a plate of sheet-brass or other suitable material, which is firmly secured to the case B, of wood or any other suitable material. Said plate is provided with a series of semicircular or segmental slots, *a a′ a² a³*, &c., as clearly shown in Fig. 1 of the drawings, and under these slots are situated the wheels *b b′ b² b³*. These wheels revolve freely on pivots *c*, secured in the face-plate A, and they are concentric with the slots *a a′ a²*, &c. Each wheel is provided in its upper side with a series of holes or cavities, *d*, to receive the point of a pin or pointer, C, a detached view of which is seen in Fig. 2, and these holes are at such a distance apart that ten of them will be visible through the segmental slots *a a′ a²*, &c. On the sides of the slots, and corresponding to the holes, are figures from 1 to 9, the figures on the concave side being in reverse order to those on the convex side, as shown in Fig. 1, The wheels themselves are also marked with figures, running twice from 0 to 9; or, in case the slots *a a′ a²*, &c., should only occupy one-third of the circle, the figures on the wheels would have to run three times from 0 to 9, &c. One of these figures on each wheel is visible through a hole, *e e′ e² e³*, &c., and in making a calculation the figures visible through these holes give the result.

From the under surfaces of the wheels *b b′ b²*, &c., project pins *f*, one pin to each ten figures on the upper surfaces of said wheels, and these pins act on noses *g*, which project from the edges of rods *h*. These rods are hinged at one end to the under surface of the face-plate, and their other ends are pivoted to bars *i*, which slide in suitable guide-brackets *j*. From the bars *i* project triangular teeth *k*, which engage with ratchet-teeth *l* on the peripheries of the wheels *b′ b² b³*, &c., as shown in Fig. 2. Springs *m* have a tendency to depress the rods *h*, holding the same in contact with the stops secured in the under surface of the face-plate, and other springs, *o*, have a tendency to keep the teeth *k* in gear with the ratchet-teeth of the wheels *b′ b²*, &c. Suitable stop-pawls *p*

prevent a backward movement of the wheels b b', &c.

A rod, q, which slides in suitable guide-brackets r, is provided with pins s, which, when said rod is moved in the direction of the arrow marked on it in Fig. 2, will strike the bars i and throw the teeth k out of gear with the wheels b' b^2, &c. Suitable notches t in the upper edge of the rod are made to drop over the edge of a plate, u, which is secured to the end of the case B, and thereby said rod is held in position when drawn out against the combined action of the springs o.

In adding up a column of figures the operation of my machine is as follows: Suppose the following figures are to be added:

254
622
358

1234

I first adjust all the wheels b b' b^2, &c., 0 to—that is to say, to such a position that nothing but ciphers are visible through the orifices e e', &c.—and then I put the pin C in the hole opposite the figure 4 on the convex index of the slot a of the unit-wheel, and turn the wheel until the pin C strikes the lower end of the slot a; then I place the pin in the hole opposite the figure 2, and turn the wheel again until said pin strikes the end of the slot; then I put the pin in the hole opposite the figure 8, and turn the wheel until said pin strikes the lower end of the slot. During this last motion of the wheel b one of the pins f passes the nose g on the rod h, and by raising the same causes the tooth k of the bar i to turn the wheel b' one tooth. After this has been accomplished the second row of figures is added up like the first, using the second or tenth wheel b' instead of the first or unit wheel b; and finally the third row is added up, using the third or hundreds wheel b^2, and the result appears in the orifices e e' e^2, &c., as shown in Fig. 1.

In subtracting one figure from another I proceed as follows. Example:

From 4321
subtract 2756

1565

Register on the face-plate the figures 4321; then on the concave side in the unit-wheel b draw down with the pin 6. This brings 5 opposite the units-orifice e. Then, as 6 is greater than 1, carry 1 to 5, which makes 6, and move 6 down on tens-wheel b', which will leave 6 in tens-orifice e'. For the same reason, in hundreds-wheel b^2 bring down 8, leaving 5 in hundreds-orifice e^2. Next bring down 3 in thousands-wheel, leaving 1 in the thousands-orifice e^3, giving the remainder, 1565.

For multiplying two figures I use the slide D, which moves in suitable guiding-grooves v in the edges of the case B, as shown in Fig. 3, and which is provided with two slips, w w', of glass or other suitable material, one of which is stationary and the other movable, and which are divided into a certain number of equal parts, according to the extent of the adding ruler's power. The multiplicand is penciled on one and the multiplier on the other strip, as shown in Fig. 1 of the drawings, and the operation is carried out as follows: Bring the figure 2 of the multiplier opposite the figure 4 of the multiplicand; mark the result, 8, on the unit-wheel 6; move the slip w so that the figure 2 is opposite to 8 and the figure 3 opposite to 4; multiply 3 by 4 = 12, and mark the 2 on the tens and the 1 on the hundreds wheel; multiply 2 by 8 = 16; mark the 6 on the tens and the 1 on the hundreds wheel; move slip w so as to bring figure 3 opposite to 8 and figure 2 opposite to 2; multiply 3 by 8 = 24; mark 4 on the hundreds and 2 on the thousands wheel; multiply 2 by 2 = 4; mark on hundreds-wheel; move slip w so as to bring 3 opposite to 2; multiply 3 by 2 = 6, and mark on the thousands-wheel, and the result, 9088, will appear through the orifices e e' e^2 e^3.

In the same manner two figures of any magnitude can be multiplied, provided the number of wheels on the face-plate is large enough to mark the result.

This machine is very simple in its construction. It can be operated with ease and facility, and the liability of making an error is materially reduced.

By the application of the disengaging-slide q the operation of setting the wheels back to 0 is materially facilitated, and much time is saved in the operation of the machine.

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

1. The face-plate A, with segmental slots a a' a^2 and orifices e e' e^2, in combination with the wheels b b' b^2 and pointer c, all constructed and operating in the manner herein shown and described.

2. The jointed rods h i, with noses g and teeth k, in combination with the toothed wheels b b' b^2 and pins f, constructed and operating substantially as and for the purpose set forth.

3. The disengaging-slide q, in combination with the carrying mechanism, constructed and operating substantially as and for the purpose described.

4. The multiplying-slide D, with strips u u, in combination with the adding mechanism, constructed and operating substantially as and for the purpose set forth.

The above specification of my invention signed by me this 25th day of January, 1866.

SAM. JNO. KELSO.

Witnesses:
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CHS. T. HEWITT.