

F. F. WARNER.
 ADDING MACHINE.

No. 110,520.

Patented Dec. 27, 1870.

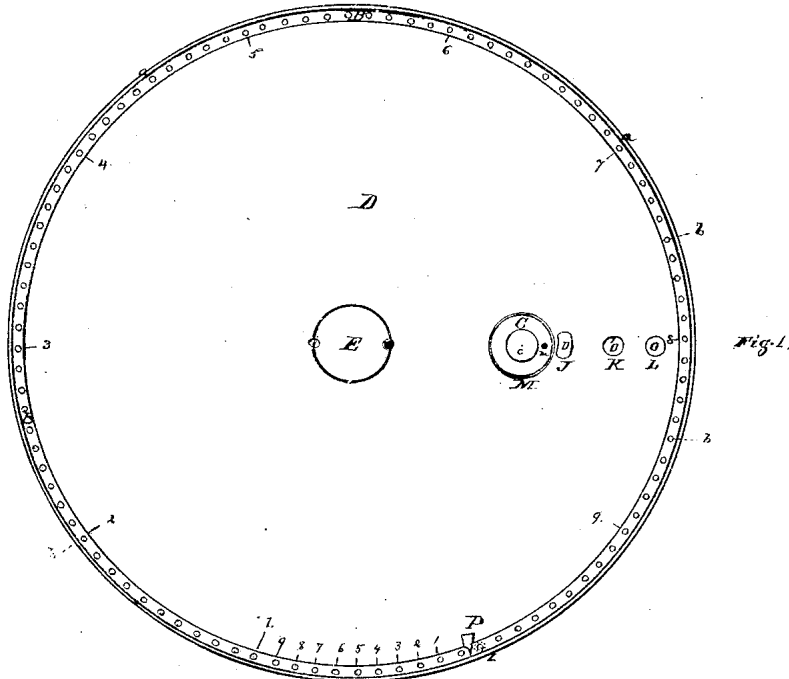


Fig. 1.

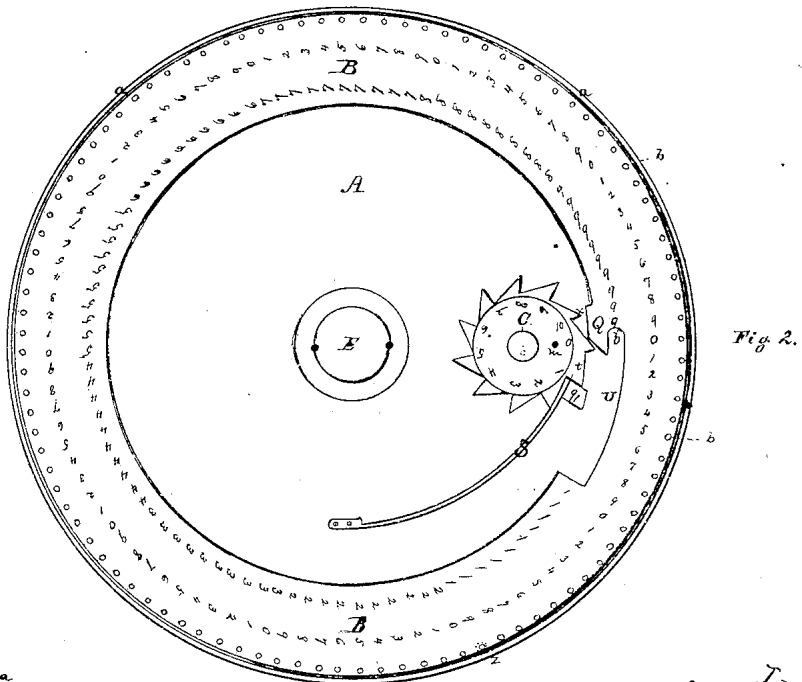


Fig. 2.



Fig. 3.

Witnesses
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FRANCIS F. WARNER, OF CHICAGO, ILLINOIS.

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IMPROVEMENT IN ADDING-MACHINES.

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

I, FRANCIS F. WARNER, of Chicago, in the county of Cook and State of Illinois, have invented certain Improvements in Adding-Machines, of which the following is a full, clear, and exact description, to enable others skilled in the art to make and use the same, reference being had to the accompanying drawing, which, together with the letters of reference marked thereon, form part of this specification, and in which—

Figure 1 exhibits a plan view of my adding-machine.

Figure 2 is the same, with the stationary disk or cover removed.

Figure 3 is a transverse vertical section, through the center of fig. 1.

General Description.

A is a circular disk or plate, having a rim, *a*, projecting upward a little distance entirely around the periphery thereof.

B is an annular plate resting loosely upon the disk A and extending to the rim *a* at every point, and so fitted that it may revolve easily within said rim. A series of numerals is marked upon this annular plate, commencing with zero (0) and extending to 99. These figures are in two lines, excepting the first 0 and the first nine digits, which occur singly in the outer or units line. The double line commences at 10, the cipher (0) of which numeral is in the outer line, while the 1 is in the inner or tens line.

C is a ratchet-wheel revolving upon a hub, *c*, projecting from the disk A. A series of numerals from 0 to 10 is marked upon this wheel, the figures occurring at regular intervals. This I term the "hundreds-wheel," as it indicates the number of hundreds result of the adding.

D is a circular plate secured to the disk A at the hub E, being rigidly attached to said disk. The plate D extends nearly to the rim *a*, leaving a narrower space between the edge of the disk and the rim *a*. Through this narrow space in fig. 1 of the drawing may be seen the edge of the annular plate B, which plate is provided there with a number of holes, *b*, which correspond to the numerals marked on said wheel.

The plate D which I term the "face-plate" is marked with numerals to correspond to the numerals on the annular plate B, except that the continuous figures extend only so far as the first nine digital numbers, after which the tens are numbered 1, 2, 3, 4, 5, 6, 7, 8, 9, as will be clearly understood by reference to fig. 1 of the drawing.

The plate D is provided with openings J K L, through which may be seen figures marked on the annular plate B and on the hundreds-wheel C.

M is also an opening in the plate D, immediately over the hundreds-wheel C, for the purpose of operating said wheel, as will appear.

P is a stop attached rigidly to the plate D, and extending across the narrow space between said plate and the rim *a*.

My machine operates as follows:

Say, to add the figures $20+30+57+10$. Supposing the machine to be set at zero, so that three 0's are seen at the openings J K L; a pointer is now made use of and placed in the hole *b*, just opposite the numeral 2, which indicates 20 on the face-plate, or, in other words, 2 in the tens column, and, by the aid of the said pointer, the annular plate B is revolved until the pointer strikes against the stop P, when the figures 2 0 will appear at the openings K L. 30 is added in a similar way when it will be found that 5 0 will appear at the openings. The next number 57 is added by bringing up the 5 of the figures representing the tens column first, and then by adding 7, when 1 0 7 will appear at the holes J K L. At the conclusion of each one hundred added by the annular plate B, the hundreds-wheel C is turned forward one notch, so as to present a new figure at the opening J.

This motion of the hundreds-wheel is produced by a projection, Q, on the plate B, which catches the ratchet of the said wheel and produces the desired motion.

A spring, S, attached to the disk A plays in the ratchet of the wheel C, and prevents any reverse motion of said wheel. This spring is so arranged to press upon the incline of the ratchet-teeth that the force of the spring will bring the wheel back each time it is moved forward, so that the spring rests against the radial face of the succeeding ratchet.

To make this perfectly clear, let it be remarked that each ratchet-tooth is cut with a face tangential and a face radial to the wheel. The spring in the forward motion of the wheel slides over the tangent face of one tooth and falls upon the tangent face of the next tooth. Now the incline of the face of the tooth and the pressure of the spring tend to bring the wheel back so far that the end of the spring shall bear against the radial face of the tooth just passed. The purpose of this is to insure the numbers on the wheel C to stand each time at a given point, so that the number presented at the hole J in the plate D shall be duly in its place, and not too much up or down.

Q is a projection on the spring S, which extends outward toward the annular plate B, but not so far as to interfere with the free passage of the projection Q on said plate, except when the spring rests upon the tangent face of the ratchet-tooth *t*, which, it will be observed, is farther from the center of the wheel C than are the rest of the ratchet-teeth.

When the spring rests upon this tooth the figure 10 will appear at the opening J, and the projection Q will catch upon the projection *q*, and further forward motion

of the machine is arrested, the limit of its adding having been reached.

A slot, U, is cut in the plate B opposite the first 0, and the first nine digits in the line of the inner line of numerals; this slot permits the play of the spring, and serves also to exhibit a cipher, which is marked upon the lower disk A, and is seen through said slot U, which cipher is marked *i* in the drawing, to clearly designate it. The purpose of this cipher is to cause the numbers to read right after reaching one hundred in the addition.

I set my machine at zero to commence adding by inserting the pointer in a hole *m*, in the hundreds-wheel, which is readily done through the aperture M and turn said hundreds-wheel forward until the 0 appears at the opening J. I then revolve the plate B in a reverse direction until the inclined surface at the lower end of the projection Q strikes the incline or tangent face of the ratchet-tooth on the hundreds-wheel just opposite the 0 of the hundreds-wheel, which is as far as said plate can be turned in this direction; a cipher (0) will now appear at the hole L, and the cipher *i* will be seen through the aperture K, being uncovered by the slot U.

In setting forward the hundreds-wheel it will be found sometimes necessary to move forward the plate B, to prevent the teeth of the ratchet from engaging the projection Q. I make one of these teeth, *x*, a little shorter than the rest, to allow the projection Q to play past it in setting the machine at zero.

It will be observed that I place the first nine digital numbers on the face-plate next to the stop P. These nine numerals correspond to the units column in addition, while the other figures on said face-plate placed at intervals of ten holes apart, correspond to the tens column; for instance, in adding up the number 57, as above, I would first put forward one figure, say the 5, in the tens column, then the 7 in the units column, and the result would be 57 at the adding-point.

I make the projection *q* on the spring S of sufficient length, so that it shall extend outward a little beyond the point of the ratchet-tooth, against which it rests, as will appear in the drawing. The purpose of this is to prevent the projection Q from engaging said tooth-point in case of any mechanical inaccuracy of construction.

For an obvious purpose I make the hole J of an ob-

long shape, so that a little extra latitude is allowed in presenting the figures on the hundreds-wheel.

To illustrate this, let it be observed that when the result reads 97 at the adding-point, the projection Q will have just encountered the ratchet-tooth opposite the 0 on the hundreds-wheel. Now, if one more unit is added, the projection Q will have set forward the hundreds-wheel a little way, 98 will appear, and so also in succession 99; but the 0 will not have disappeared from the opening J, because of the oblong shape of said opening, nor will the 1 of the hundreds-wheel have appeared until the 99 has passed, when the one of the hundreds-wheel will appear, the sum total of the figures added then being 100, and so on at each succeeding hundred.

It is believed that the oblong shape of the hole J is necessary in any practical construction of a similar machine sufficiently small to be conveniently used by holding it in the hand.

Claims.

Having thus described my invention,

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

1. The annular plate B, having holes *b*, slot U, and projection Q, and having the numerals marked thereon, as described, substantially as specified.
2. The ratchet or hundreds-wheel C, with numbers marked thereon, as specified, and the spring S, with its projection *q*, in combination with the annular plate B, having a projection, Q, substantially as and for the purpose specified.
3. The hundreds-wheel C, having the incline surface of the ratchet-tooth *t* extending farther out than the remaining teeth, for the purpose set forth, and substantially as specified.
4. The combination of the face-plate D, having apertures J K L M and a stop, P, and numerals marked thereon, as described, the annular plate B, hundreds wheel C, and disk A, arranged substantially as specified.

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Witnesses:

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