C. E. PATTERSON.
Calculating-Machine.

No. 203,763. **Patented May 14, 1878.**

Fig. 1.

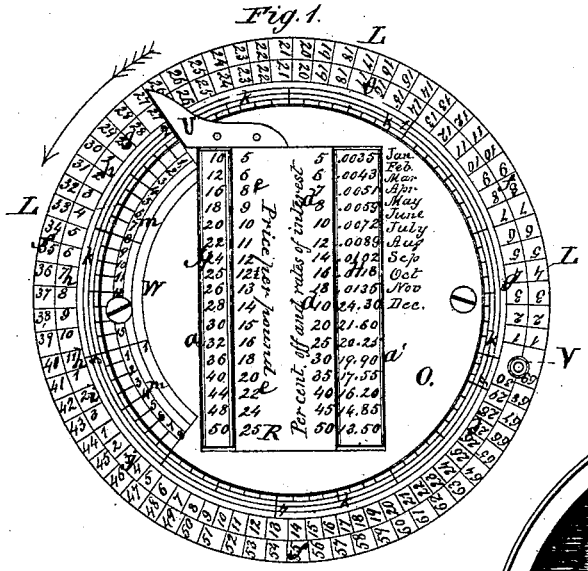


Fig. 2.

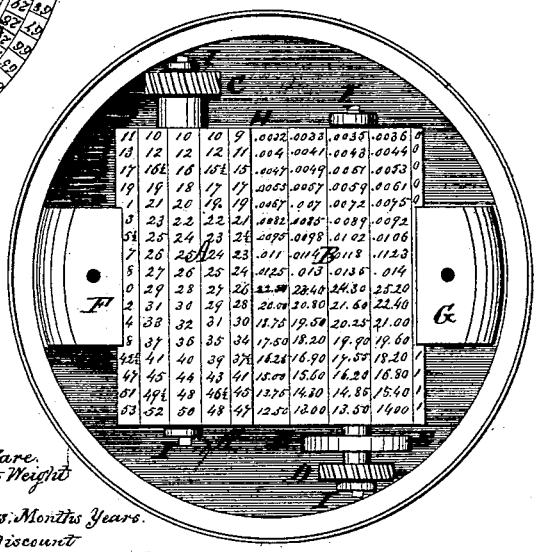


Fig. 5

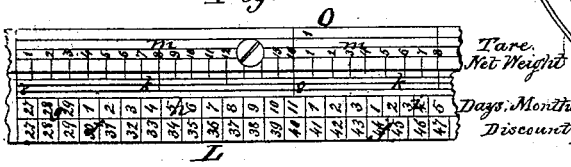


Fig. 3

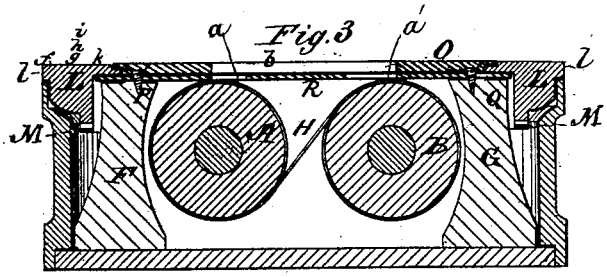
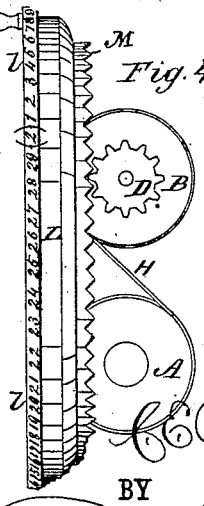


Fig. 4



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CHARLES E. PATTERSON, OF COVINGTON TOWNSHIP, TIOGA COUNTY, PA.

IMPROVEMENT IN CALCULATING-MACHINES.

Specification forming part of Letters Patent No. **203,763**, dated May 14, 1878; application filed July 5, 1877.

To all whom it may concern:

Be it known that I, CHARLES E. PATTERSON, of Covington township, Tioga county, Pennsylvania, have invented a new and useful Machine Used in Mathematical Calculations, the plan of which machine and its practical workings are fully set forth in the following specification, reference being had to the accompanying drawings.

The object of my invention is to make rapid and correct mathematical calculations in ordinary business matters, as follows: It will show the amount of any number of pounds, ounces, hundreds-weight, or tons at any given price. It will deduct tare, showing net weight. It will show how much of any article can be bought at a given sum per pound for a given sum of money. It will calculate interest, discount, per cent. off, and per cent. added. It will calculate the difference in dates, leaving only to find the difference between two single numbers, the sum of both not exceeding 364.

This machine is constructed in the following manner: K represents the case inclosing the machine; A and B, two rollers, of equal size and length, which have their bearings at I I. The cog-wheel C on roller A is attached to a shaft running through the center of the roller, and both cog-wheel and roller are attached fast to this shaft. The other roller, B, turns upon a shaft running through the center, to which is attached fast cog-wheel D. H H represent a coil of paper or cloth, upon which, on both sides, are printed or written figures, in columns corresponding in number to those on the right and left hand sides of plate R in Figure 1. E represents a spring, one end of which is attached to the roller B and the other attached to the shaft upon which this roller turns, pressing in an opposite direction from which the coil or ribbon of paper is moving, whether on or off from the roller. F and G represent stationary posts, which are fastened to the bottom of the case. The plate R, which has narrow parallel slots *a a'*, rests on these posts F G, and the circular top plate O, which has a large rectangular slot, *b*, rests on said plate R. Both plates R and O are secured or fixed in position by screws P Q, that enter the upper ends of the posts. The annular or ring plate L has a lip or flange on its inner edge, which is overlapped by a similar flange on the outer edge of the circular plate O, so that the plate L is held concentric with the plate O, although movable around it. The plate L has a pendent toothed rim or flange, M, that meshes with the gear C D fixed on the respective rollers A B. Hence, when the plate L is rotated or carried around the stationary plate O, it will rotate the gears C D, and thereby turn the rollers A B and cause the ribbon H to move in one direction or the other by winding on one roller and off the other.

The several plates R O L are inscribed with figures, as follows: The central part of plate R has two rows of figures, one, *d*, indicating rates of interest and discount, the other, *e*, indicating price per pound. The movable ring-plate L has four rows of figures on its face, to wit: the outer row *f*, in which the numbers run from 1 to 69, which are used in calculating discount. The second row has several numerical divisions. One division, *g*, is composed of numbers from 1 to 29, inclusive, for days in a month. The next division, *h*, has numbers from 1 to 11, for months in a year, the number 1 standing in lieu of 30, for days in a month. The next division, *i*, has numbers from 1 to 3, indicating years. (Of course, the number could be carried beyond 3 to indicate any greater number of years.) These numerical divisions *g h i* are used in calculating interest. The fourth division, *j*, is composed of numbers from 1 to 30, inclusive, for calculating difference between dates. The inner or third row, *k*, of figures on plate L runs from 1 to 5, inclusive; but the space between each two figures (say between 1 and 2, or between 2 and 3) is divided by graduations into sixteen parts, to facilitate calculating cost of any number of pounds at any price per pound.

On the outside edge of the movable plate L, Fig. 4, is a row, *l*, of figures, from 1 to 29. These are succeeded by the figure 2. Then the figures 1 to 29 are repeated, with 3 and 4 following in order after each such repetition. These figures are used to calculate any number of months into days, and vice versa.

On one side of the fixed circular plate O is a row of figures, *m*, from 1 to 15, inclusive, and repeated. These figures are used, in connec-

tion with the outside row, *f*, of figures 1 to 69 on plate L, for calculating tare and net weight.

On the right side of the opening in plate O is a column composed of the names of the months in the year. This column is used to calculate the difference in time exactly between two dates.

A gage, U, is attached to plate O, for use as hereinafter specified.

To operate the machine, the plate L is turned or rotated by means of the stud V. The straight-edge of gage U is shown in Fig. 1 next to figure 2 in row *k* of plate L.

To calculate the price of any number of pounds at any price per pound, turn plate L to the left (see arrow) until the edge of gage U is opposite the number of pounds, when the aggregate price will appear through slot *a* on the band H opposite the price per pound in row *e* on plate R. For example, suppose the number of pounds is five and the price per pound is six cents. Turn plate L to left until the number 5 of row *k* is in line with the gage; then the number 30, which is the answer sought, (in cents,) will appear on ribbon H opposite the price per pound—to wit, six cents—in row *e* on the plate R.

To calculate net weight, turn plate L until the number in row *k* indicating gross weight comes opposite the number of pounds to be deducted, which will appear in row *m* on plate O. The net weight will then appear in front of gage U in row *k* on plate L, and by reference to the figures on the roller A (shown through the opening in plate R) the cost at any price per pound will be shown. For example, suppose a butter-dish weighs one pound, but when filled with butter weighs three pounds. In this case the tare is one pound; so, instead of turning the plate L until the number 3 is in line with the gage U, we should stop at the 1-pound mark. Then the number 2, which indicates the net weight, will be in front of the gage. The row *m* of figures is thus of use to show where to stop the rotation of plate L when we wish to deduct tare.

To calculate interest, proceed as follows: Suppose the number of days for which interest is to be calculated is twenty-nine and the rate per cent. is six. Then turn plate L to the right until 29 in division *g* of the second row of figures thereon is in front of gage U. Then the amount of the interest of one dollar for twenty-nine days will appear on the ribbon H opposite the number 6 of the right-hand row *d* of figures on plate R. By multiplying the principal by this amount the whole interest will be ascertained.

To calculate difference in dates, place the gage U opposite the day of the month of the lesser date in division *g* of center circle of figures in plate L. Then on the ribbon H, opposite the name of the month on the right of the opening *a'*, will appear the number of days already past or gone by during the year. Then turn plate L to the left until gage U is opposite the number corresponding to greater date. Then on ribbon H, through the opening in plate R opposite the name of month, will be shown the number of days since the year began. The difference will be the exact time. Where the time is in two different years, calculate from last date to first by the rule, then subtract from 365 for correct difference.

To find the time between the 10th of February and the 12th of November, turn plate L until the number 10 in the second row of figures thereon appears in front of the gage U. Then look opposite February on plate R, and see how many days of the year have gone, which will be 41. Then turn plate L until the number 12 (for 12th day of November) appears in front of gage U, and the number 316, which is the number of days past, will appear on ribbon H opposite November on plate O. Then subtract 41 from 316, which leaves 275, the number of days between February 10 and November 12. To find the time between November 12 and February 10, perform the same operation as before, and take the last result, or 275 days, from 365 days, and the remainder, 90, will be the number of days between November 12 and February 10.

To reduce days to months, or months to days, proceed as follows: Suppose the number of days is 60. First find 60 in the outer row *f* of figures on plate L, and then look on the edge *l* of said plate, directly opposite the point where 60 is located, and the number 2 will be seen, which is the answer required. If the number of days be 57, then 27 will appear on edge *l*, opposite 57, in row *f*, which is the number of days above a calendar month. Then, by looking back on edge *l*, the number 1 will be found inclosed in brackets, which indicates the month.

To calculate discount or per cent. off, place the gage U opposite or in line with the number of dollars to be discounted, which will appear in the outside circle of figures on plate L, Fig. 1. Then on the ribbon H, Fig. 1, opposite the rate per cent. of discount shown in lower part of column *d* of figures on plate R, will appear the answer—that is to say, the remainder.

What I claim is—

The combination of ribbon H, the two rollers and the gears or toothed wheels, the outside revolving plate L, a gage, and the apertured plate R, said ribbon and plates bearing numbers, as shown and described.

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Witnesses:

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F. E. WATROUS.