A. Johnson.
Calculating Machine.

Nº 85229

Patented Dec. 22, 1868

Fig. 1
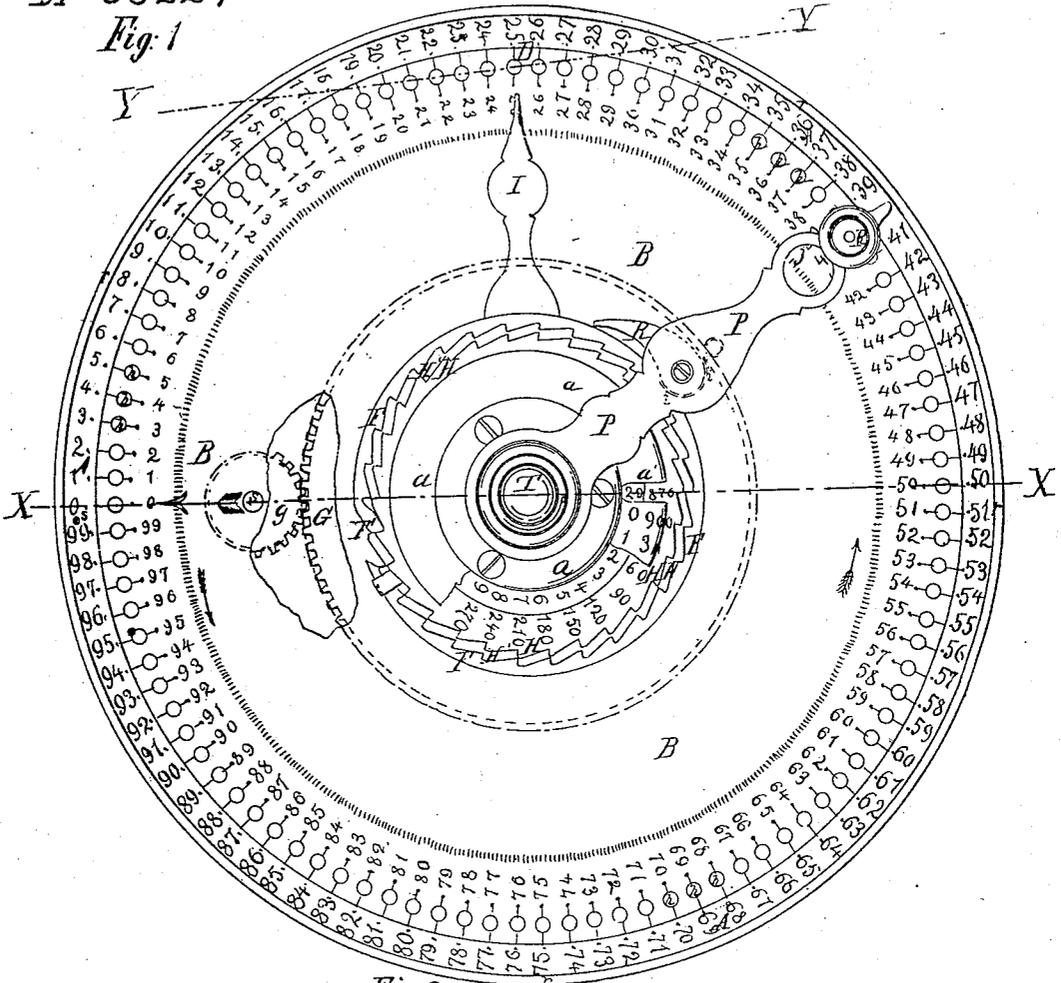
Fig. 2
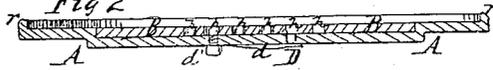
Fig. 3
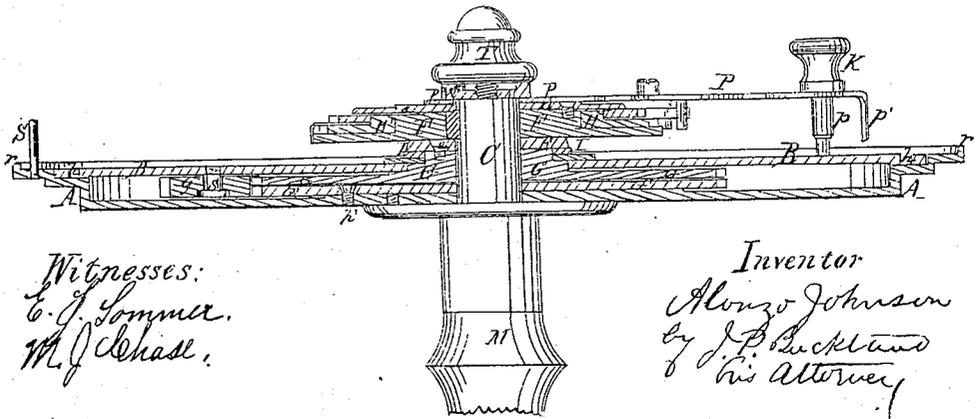
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IMPROVEMENT IN CALCULATING-APPARATUS.

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, ALONZO JOHNSON, of Spring-field, in the county of Hampden, and Commonwealth of Massachusetts, have invented a new and improved Calculating-Machine; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, and to the letters and figures of reference marked thereon, in which—

Figure 1 is a plan view of said calculating-machine, a portion of the dial and of the upper disk being shown as broken away, to display the parts beneath;

Figure 2 is a vertical sectional view of the same, the plane of section being indicated by the line *y y* in fig. 1; and

Figure 3 is a vertical axial section of the same, the plane of section being indicated by the line *x x* in fig. 1.

My invention is designed to ascertain and indicate; within certain defined limits, the sum or amount of numbers which are to be added together, and at the same time to indicate, also, how many such numbers have been added.

In the form shown, said machine is particularly intended as a counter for lumber-yards and similar uses, and can be made to indicate the aggregate number of feet in any lot of lumber as rapidly as the contents of the several boards or pieces are called off or enumerated, in loading or handling it, and will further indicate the exact number of boards or pieces so called off or enumerated. The limit of its capacity, as now represented, is to add numbers not greater than one hundred, to a sum-total not exceeding ten thousand, and, to make up this total, any number of additions, not exceeding nine hundred, can be made.

As applied to reckoning lumber, the feet in nine hundred boards can be added together, and can be correctly expressed on the dial, to the amount of nine thousand nine hundred and ninety-nine feet, in figures, while the next, or zero-point, will show a complete revolution, or a sum-total of ten thousand feet, and if the sum exceeds the last-named amount, the instrument will proceed to add further, without any adjustment of parts, and the addition will begin again at a unit. In such case the amount finally shown on the dial can be increased by the ten thousand feet already added up.

The limit of one hundred feet for single numbers is selected as a convenient limit, which single boards or pieces of lumber seldom exceed, as to the feet contained in them.

It will, however, be evident, from an examination of the construction and operation of said calculating-machine, that its capacity, both as to the value of the single numbers to be added, the total amount, and the number of additions, can be indefinitely increased by substituting a finer graduation, additional registering-wheels, or like mechanical expedients, without deviating in the least from the operative principles of the machine herein described and represented.

The device for adding the feet is entirely independent of the device which registers the number of additions, or the number of boards called of, (which last-named device I denominate "a board-counter,") and the latter may be removed without impairing the operation of the instrument as an adding-machine in any degree.

The construction of my invention is as follows, (the devices for adding the numbers being first described, and then the construction of the board-counter, and the whole instrument as combined:)

The base-plate A of the machine is a circular disk, in the face of which is a circular recess for containing a set of differential gears, and a seat for the revolving dial-plate.

A handle, M, is attached below the plate, for holding the instrument while in use, and an axial hub, C, projects from the centre of the circular recess, and forms the arbor, about which the revolving disks move.

A narrow annular portion of the surface of the base-plate, inside the rim *r*, is level with the surface of the revolving dial B, and is graduated in one hundred divisions, and numbered from 0 to 99 inclusive.

A pin, S, projects from the annular portion, between the figures 0 and 99, merely to show the starting-point in operating the machine.

The dial B is a flat plate, of brass, which fits within the annular portion of the base-plate, so as to form a plane face, over which the index can move with regularity.

A central opening is made in the dial, through which the hub of the differential gear beneath projects.

A series of one hundred small round openings, *h h*, is arranged in a circle concentric with and near to the edge of the dial-plate, and placed radially within them are the figures of the graduation, from 0 to 99 inclusive.

Light radial lines are engraved on the dial, extending from the figures to the edge, so as to assist in bringing the figures on the dial in the exact line of the corresponding figures on the edge of the base-plate.

A flat steel index, I, turns about the same centre as the dial-plate, and its use is to indicate the number of hundreds added together, which number will be found in the circle of figures on the edge of the base-plate.

To operate this index, a geared wheel, G', is secured to the bottom of the base-plate by the screw *h'*, and has one hundred and one teeth on its periphery.

Another geared wheel, G, of the same diameter, but having only one hundred teeth on its periphery, is placed immediately above G', and is free to revolve about the arbor C, and will carry with it the index I,

which is held against the hub of G by the plate E screwed to it. The plate is not to be screwed down so tightly as to prevent the index from being turned and adjusted without turning the gear, but there must be sufficient friction upon the index, so that it will move with the gear G.

To complete this set of differential gears, a small gear-wheel, g, or traveller, is pivoted to the under side of the dial-plate by the screw s, and is carried around with the dial as the latter is turned. As it also engages with the gears G G', it is evident that it will also revolve on its own axis when the dial-plate is turned; and as the gear G', which has one hundred and one teeth, is fixed, while the upper gear, G, which has one tooth less, is left free to turn, it is also evident that when the dial-plate makes one complete revolution, the gear G will be moved forward one one-hundredth of a revolution, and will carry with it the index I, so that if the index were set at 0 at the start, it will be moved forward to the figure 1 when the dial-plate has been revolved once.

To revolve the dial-plate, a pointer, P, turns around the arbor C as a centre, above the disks of the board-counter.

A washer, W, with a steady-pin projecting into the end of the arbor, to prevent its turning, rests upon the hub of the pointer, and is held down by the thumb-nut T, so that the bearing of the pointer can always be tightened and kept true.

A round stud, p, projects from the under face of the pointer, and its end is fitted to enter the holes h h in the plate B.

A small knob, k, is applied over the stud, so as to operate the pointer by the thumb and finger.

The outer end of the pointer is bent down at a right angle, and falls directly over the line of figures on the edge of the base-plate.

If, now, the instrument be used for adding numbers, without reference to the board-counter, the index I would be brought to the character 0 in the outer line of figures, and the dial revolved to the position shown in fig. 1. In the same figure the pointer is shown as opposite the number 40, in the outer line of figures, and the stud s is entered in the hole h in the dial beneath.

If the pointer be now brought around to 0, the dial will be brought around with it. If the pointer be again swung back to 40, and then brought back to 0 with the dial, and this operation be a third time repeated, three forties will have been added together, and the sum total of one hundred and twenty will be indicated, as follows: The index I will have moved past the figure 1 in the outer line of figures, showing an amount of over one hundred, and the excess over one hundred will be shown by those figures on the dial which are found to be opposite to 0 on the edge, which figures, in this case, will be 20, thus making the total amount to be one hundred and twenty.

A circular opening, J, is made near the end of the pointer, through which the tens and units figures of the sum-total can be seen, while the hundreds will always be found at the end of the index I, in the outer line of figures.

When, therefore, the instrument is adjusted, the operator has only to carry forward the pointer, in the direction of the hands of a watch, until the end p points to the number which is to be added in to the amount. The elasticity of the steel pointer then acts as a spring, to force the stud s into the proper hole in the dial beneath, and the dial and pointer are revolved back to 0, and a like operation is repeated with each number, as fast as the several numbers to be added are called off.

To prevent the dial from moving in a retrograde direction, a small detent, D, works through an opening in the bottom of the base-plate, into the holes in the dial, being held to place by a spring, d. The end of this detent is bevelled, so as to admit of turning the dial forward, but not in the opposite direction.

I will now proceed to describe the board-counter, which makes a part of the machine shown.

Upon the top of the washer E is placed the base, F, of the board-counter, which fits upon the arbor C, and is prevented from turning around it by the feather f, which enters a groove in the arbor.

A thin washer is interposed between E and the lower face of F, and a notch is cut in the edge of F at F', to allow a pawl attached to the pointer to come in contact with the teeth of the graduated wheels H H'.

A shoulder is carried up from the face of the base, F, around which the annular graduated disk H' is fitted and left to revolve freely.

In a channel cut in the outer edge of H', a second graduated annular disk, H, revolves.

A cap, a, screwed to the upper face of F, holds the two disks in place.

A small slot, a', is cut into the edge of this cap, to form an opening, through which the indicated numbers can be seen on the two disks.

Thirty teeth are cut in the edge of each disk, but in the edge of H one tooth is cut much deeper than the rest.

To revolve these disks, a pawl, R, is pivoted to the under side of the pointer, and the end is forced inward and against the edge of F by the curved spring i.

Whenever the pawl reaches the notch F', it will engage with the teeth in the disk H', and the notch is long enough to allow the pawl to carry the disk forward the length of one tooth.

The pawl will then strike the end of the notch, and the pointer can be moved no further in that direction. The notch, therefore, acts as a stop, to prevent the pointer from being moved beyond the character 0.

It will be seen that the pawl will revolve the disk H' every time it is brought around to the 0 place, but will not reach the teeth of H, except when the deep tooth upon H' comes round to the notch, which, of course, will be at every thirtieth move of the pawl.

The graduation upon the disk H' is from 0 to 29 inclusive, and upon the outer disk from 30 to 900, in an arithmetical progression of which the common difference is 30.

As the disks cannot be readily turned to place when the pawl is pressing against them, the pointer is pushed forward, so as to throw the pawl out of the notch F', and then the disks are set in the position shown in the drawing, the numbers 29 and 870 showing through the slot a. If, now, the pointer be brought back to 0, the disks will be moved forward so as to bring into view the next figures, (0 and 900,) and the board-counter is then ready to register the number of additions, or the number of boards called off. The figures 900 are not regarded, but with each move of the pointer back to 0 (with each addition) the inner disk will be moved forward one place, up to the thirtieth move, when the outer disk will also be moved one place, and the disks will then show the figures 0 and 30 through the slot, indicating that thirty boards have been counted. At the next move of the pointer, the figures 1 and 30 will appear, showing that thirty-one boards have been reckoned, and so on, the inner disk moving one place at every addition, while the outer one counts by thirties, and the figures on the two disks are to be added together to indicate the whole number of boards counted, or the number of additions made.

The rate of counting by thirties is an arbitrary rate, and, by varying the conformation of the disks, might be changed to any other desired standard.

The board-counter does not differ materially in operation from that described in certain Letters Patent

granted to myself and J. A. Loomis, on the 28th day of January, 1868, for a calculating-machine, except in the removal of the case mentioned therein for containing the disks, and the use, instead thereof, of a simple notched base-plate, F; but the operation and principle of the adding-machine proper, as herein set forth, are entirely different from the construction and operation of that described in said Letters Patent, and are entirely accurate and reliable in practical use.

Having described my invention,

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

The combination and arrangement of the recessed base-plate A, revolving dial-plate B, perforated at h h, and both graduated as described, differential gears, index I, and pointer P, the whole constructed and operating substantially as described.

In witness whereof, I have hereunto set my hand, this 13th day of May, A. D. 1868.

ALONZO JOHNSON.

Witnesses:
 J. P. BUCKLAND,
 E. J. SOMMER.