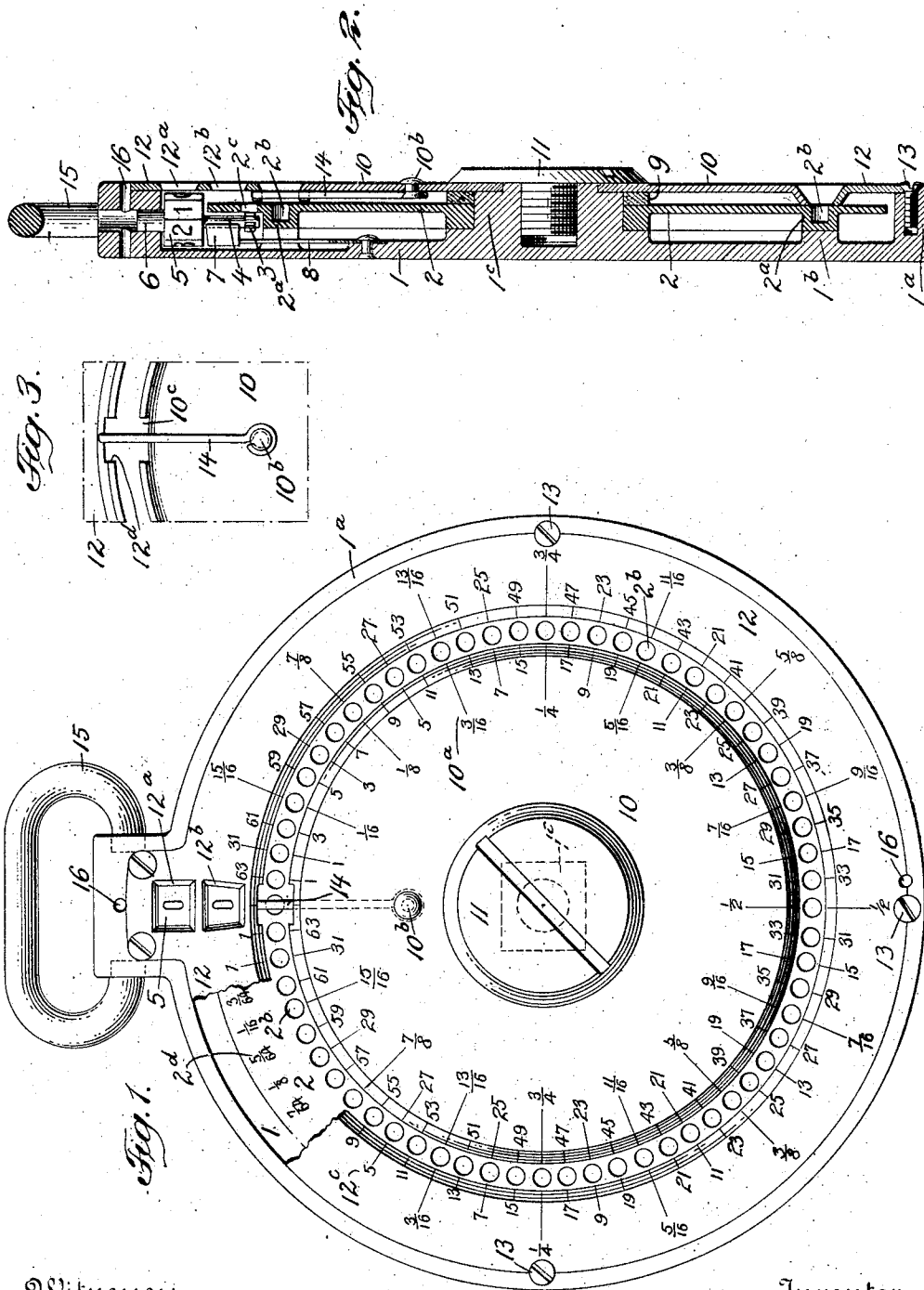


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 CALCULATING MACHINE.
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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, REYNOLD JANNEY, a citizen of the United States, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Calculating-Machines, of which the following is a specification.

My invention relates to machines or devices for performing addition or subtraction and has for its object to provide a simple device of this character by means of which common fractions may be added or subtracted continuously and the results read directly by the operator. The device is generally graduated to express common fractions of an inch (say in $1/64$ and multiples thereof) as usually employed in machinery designs, and is intended chiefly for convenient use in checking drawings whose dimensions are expressed in inch fractions, but may of course be applied to other uses.

A calculating device embodying my invention is shown in the accompanying drawings, in which—

Figure 1 is a face view, with parts broken away; Fig. 2 is a vertical section through the center of Fig. 1; and Fig. 3 is a detail rear elevation of a stop and of the parts co-operating therewith.

The device comprises a box-like circular body or case 1 (preferably cast of aluminum) and formed with a peripheral flange 1^a and, within said flange, with an annular rib or seat 1^b . At its center, the body 1 has a stud or boss 1^c on which is mounted to turn a dial 2 provided with a thickened ring 2^a corresponding in position to the rib 1^b and bearing against it. On the front or upper face of the dial are holes or recesses 2^b arranged in a circle and extending to some depth into the thickened ring 2^a . In the construction shown, there are sixty-four of these holes, evenly spaced around the dial. At one point of the dial, in line radially with the center of one of the recesses 2^b , is an elongated slot 2^c adapted to receive at the proper time, a tooth of a small pinion 3 secured to a shaft 4 arranged radially with reference to the body 1. The shaft 4 is rigid with a numbered roller 5 (Fig. 2) and with a pivot or trunnion 6 which is journaled in the body 1 with sufficient looseness to allow the shaft 4 and pinion 3 to have a lateral movement toward and from the dial 2. A yoke block 7, carried by a spring

8 secured to the body 1, tends to force the pinion 3 toward the dial 2. I have made the pinion with six teeth, but the number may be altered.

Resting on the central portion of the dial and around the stud 1^c is a friction washer 9 made of leather, cloth or other suitable material. The stud has a squared or angular outer end on which is fitted an inner cover 10 held in position by a flat-headed screw 11, so that the said cover cannot rotate. The outer edge of this cover 10 may be beveled as shown and extends to the inner edge of the circle of recesses 2^b in the dial. There is also an annular outer cover 12, attached to the flange 1^a of the body 1 by screws 13, and preferably in the same plane with the inner disk-like cover 10. The inner edge of the cover 12 may be beveled as shown and extends to the outer edge of the circle of recesses 2^b , so that the portion of the dial 2 provided with said recesses is not only exposed between the spaced edges of the covers 10 and 12, but freely accessible for the insertion in any one of the recesses 2^b , of a pointed instrument such as a lead-pencil, stylus, or the like. The outer cover 12 is provided with two radially aligned windows, through one of which 12^a , the numbered roller 5 will show, while through the inner window, 12^b , the operator may see one of the numbers of a graduation 2^d provided on the flat marginal portion of the dial. This graduation (the zero point of which shows through the window 12^b in Fig. 1) is continuous around the dial, and in the example shown is numbered according to fractions of an inch, $1/64$, $1/32$, $3/64$, $1/16$, $5/64$, $1/8$, $7/64$, etc., up to $63/64$, in a contra-clockwise direction. Only the figure in registry with the window 12^b is visible, the others are concealed by the outer cover 12.

The inner cover 10 and the outer cover 12 are provided with graduations 10^a , 12^c respectively at the edges adjoining the recesses 2^b , the zero points of both graduations being in a radial line with the centers of the windows 12^a , 12^b , one of these graduations running clockwise and the other contra-clockwise. The two graduations are otherwise alike as to numbering and as to the size of intervals (measured in degrees). The numbers nearest the edges represent 64ths, those in the second circles, a little farther away from the edges, represent 32nds and still

farther away are marked in full, the larger fractions such as 8ths, 16ths, 4ths and halves.

To the inner cover 10 is pivoted at 10^b or otherwise attached loosely a tongue or stop 14, extending between said cover and the dial 2 and across the annular exposed space between the covers 10, 12. The free outer end of said stop is located between the dial 2 and the outer cover 12. The beveled flanges at the adjacent edges of the covers 10, 12 are provided with cut-out portions 10^c 12^a, adjacent to the window 12^b, said portions allowing the stop 14 (which passes through them) to swing to one side or the other to a limited extent, the shoulders at the ends of which cut-out portions determining the extreme positions of the stop 14.

A pivoted handle 15 (similar to a watch ring hanger) is provided for the convenient carrying of the device, which may be made of the size of a small watch. Through openings 16 may be provided at two or more points for the purpose of inserting tacks, pins, or other fastening devices when it is desired to secure the instrument to a drawing board in order to avoid the necessity of holding it in one hand while the other is used to manipulate the dial.

The device is operated by means of a pencil or other convenient instrument inserted in the proper recess 2^b. First the dial 2 is turned until zeros appear in both windows 12^a and 12^b. For addition, the dial is turned clockwise, for subtraction, contra-clockwise. If for instance it be desired to add 9/64, the pencil is inserted in the recess 2^b next to that figure 9 of the outer graduation 12^c which is in the circle nearest to the inner edge of the cover 12, and is then moved clockwise (to the right) together with the dial 2, until the pencil is stopped by the wire or tongue 14 coming against the shoulders at the right of the cut-out portions 10^c, 12^a. The recess containing the pencil will thus come exactly in line with the windows 12^a and 12^b. If this movement of the dial is the first from the zero position, the number 9/64 will appear under the window 12^b. If now it is desired to add another number, say 13/32, the pencil will be inserted in the recess 2^b which stands opposite that figure 13 of the outer graduation 12^c which is in the second (or 3rd) circle, and the dial will be turned as before until the stop 14 arrests the motion. There will then appear in the window 12^b the number 35/64 this being the sum of 9/64 and 13/32. This process may be continued indefinitely. When the sum has reached one inch or more, the roller 5 will be turned by the action of the dial on the pinion 3, to bring the next number of the roller into view through the window 12^a. Each complete revolution of the dial 2 will turn the roller 5 the distance of one of its numbers.

If it is desired to subtract, the operation

will be exactly as for adding, except that the dial is turned in the opposite direction (contra-clockwise) and the figures 10^a on the inner cover 10 are used for locating the pencil, stylus, or the like. For example if we wish to subtract 3/16 from the two numbers which we added above, the pencil or stylus will be placed in the recess 2^b opposite the indication 3/16 of the graduation 10^a, and moved to the left until it engages the stop 14 and shifts the latter to an engagement with the shoulders at the left-hand ends of the cut-out portions 10^c, 12^a. The said recess will thus come into radial alinement with the windows 12^a, 12^b, and in the latter window there will appear the number 23/64 which is the result of 9/64 + 13/32 - 3/16.

It will be noticed that it is possible to bring the stylus, when moving the dial, exactly opposite the window 12^a, 12^b, whether the movement be toward the right or toward the left, for the reason that the stop 14 is movable to the right or left just far enough to clear one of the recesses 2^b when the latter is standing exactly in line with the windows. I am thus enabled to add and subtract while using a single set of holes or recesses 2^b in the dial 2, and with the numberings on the inner graduation 10^a and on the outer graduation 12^c of the covers 10 and 12 respectively placed exactly opposite each other, in inverse order.

Various modifications may be made without departing from the nature of my invention as set forth in the appended claims.

I claim:

1. A calculating device comprising a casing provided with a window, an annular opening and graduations adjacent to the edges of said opening, the numberings on the inner graduation being placed exactly opposite those on the outer graduation, but in inverse order, a dial mounted to turn concentrically with said opening and provided with recesses at intervals corresponding to those of the graduations, said recesses being exposed through said opening, the dial being provided with a graduation adapted to show in the window of the casing, and a stop secured to the casing movably and extending across the annular opening thereof to take operative positions either at the left or at the right of the window's center line.

2. A calculating device comprising a casing provided with a window, an annular opening, two graduations adjacent to the respective edges of said opening, said graduations having numberings exactly opposite each other, but in inverse order, and stop shoulders adjacent to said window, a dial mounted to turn in said casing and provided with a series of recesses exposed through said opening, and also with a graduation

adapted to show through said window, and a stop pivoted to the casing and extending across the annular opening thereof and adapted to engage said stop shoulders.

5 3. A calculating device comprising a casing provided with a window, spaced flanges with an annular opening between them, said flanges being cut out adjacent to the window, and two graduations adjacent to the
10 respective edges of said opening, the numberings of said graduations being exactly opposite each other, but in inverse order, a dial mounted to turn in said casing and provided with a series of recesses exposed
15 through said opening, and also with a graduation adapted to show through said window, and a stop secured to the casing loosely to have a limited lateral movement in the cut out portions of said flanges and extending
20 across the annular opening of the casing.

4. A calculating device comprising a casing provided with two windows, an annular opening, and graduations adjacent to said opening, a dial mounted to turn in said casing and provided with a series of recesses exposed through said opening, with graduations adapted to show through one of said windows, and with a slot or depression, a
25 pinion whose teeth are adapted to enter said depression, a numbered roller held to rotate with said pinion and adapted to show

through the other window, and elastic means for pressing the pinion toward the dial.

5. A calculating device comprising a casing having a window, an annular opening, 35 and graduations adjacent to said opening, a dial mounted to turn in said casing and provided with a series of recesses exposed through said opening, a numbered roller adapted to show through said window, a
40 shaft carrying said roller and adapted to be turned periodically by said dial, said shaft being also movable transversely toward and from the dial, and a spring for pressing the shaft toward the dial. 45

6. A calculating device comprising a stationary member or casing, another member adapted to be moved in one direction for addition and in the opposite direction for subtraction, by means of a stylus or the like, 50 and a stop secured movably to the stationary member in the path of said stylus, to limit the movement of the stylus to a definite zero point for both addition and subtraction directions of the stylus movement. 55

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

REYNOLD JANNEY.

Witnesses:

F. B. HUNGERFORD,
GEO. A. QUIGLEY.