

(No Model.)

2 Sheets—Sheet 1.

F. L. BANCROFT.  
CALCULATING MACHINE.

No. 377,823.

Patented Feb. 14, 1888.

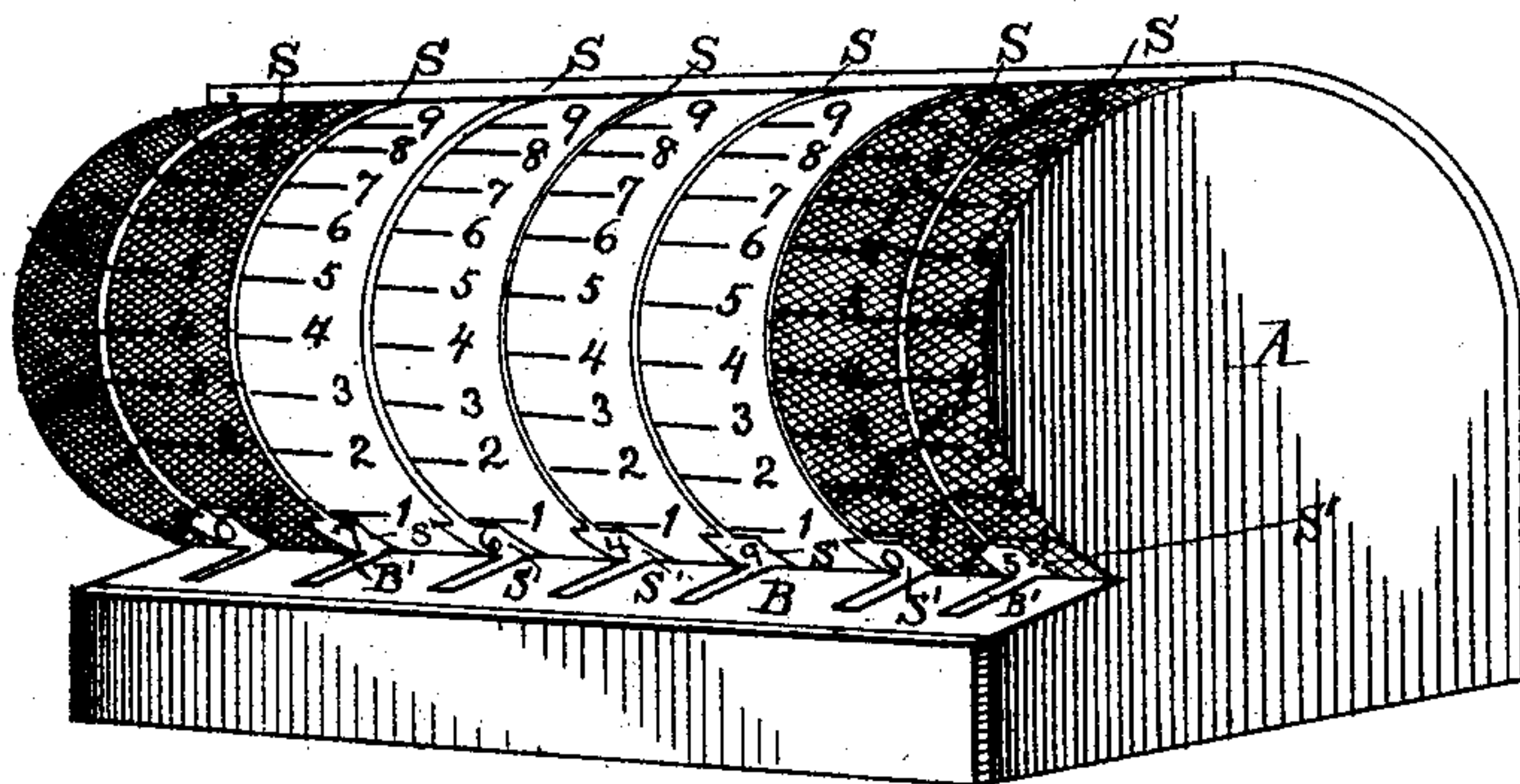


Fig. 1.

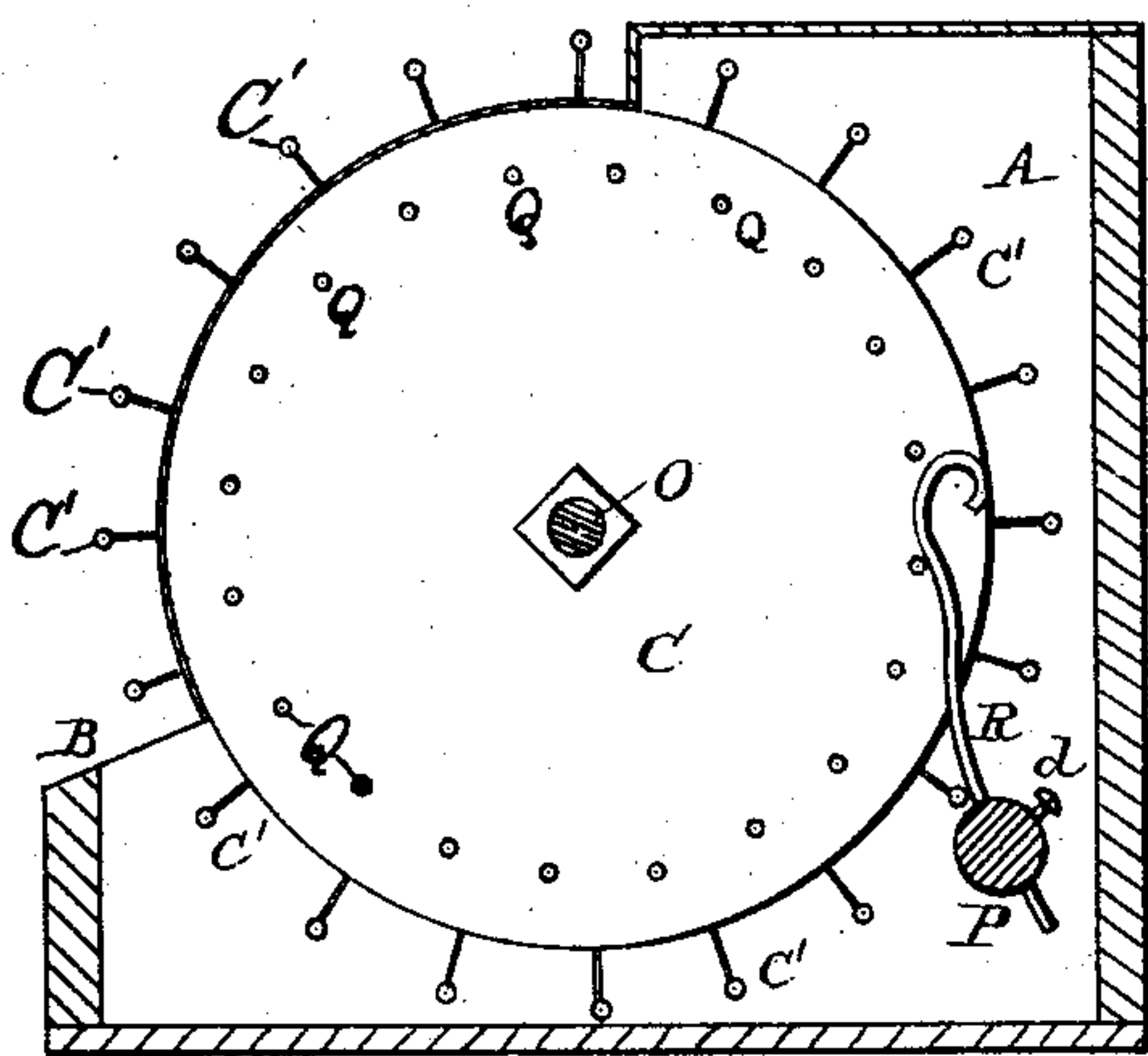


Fig. 2.

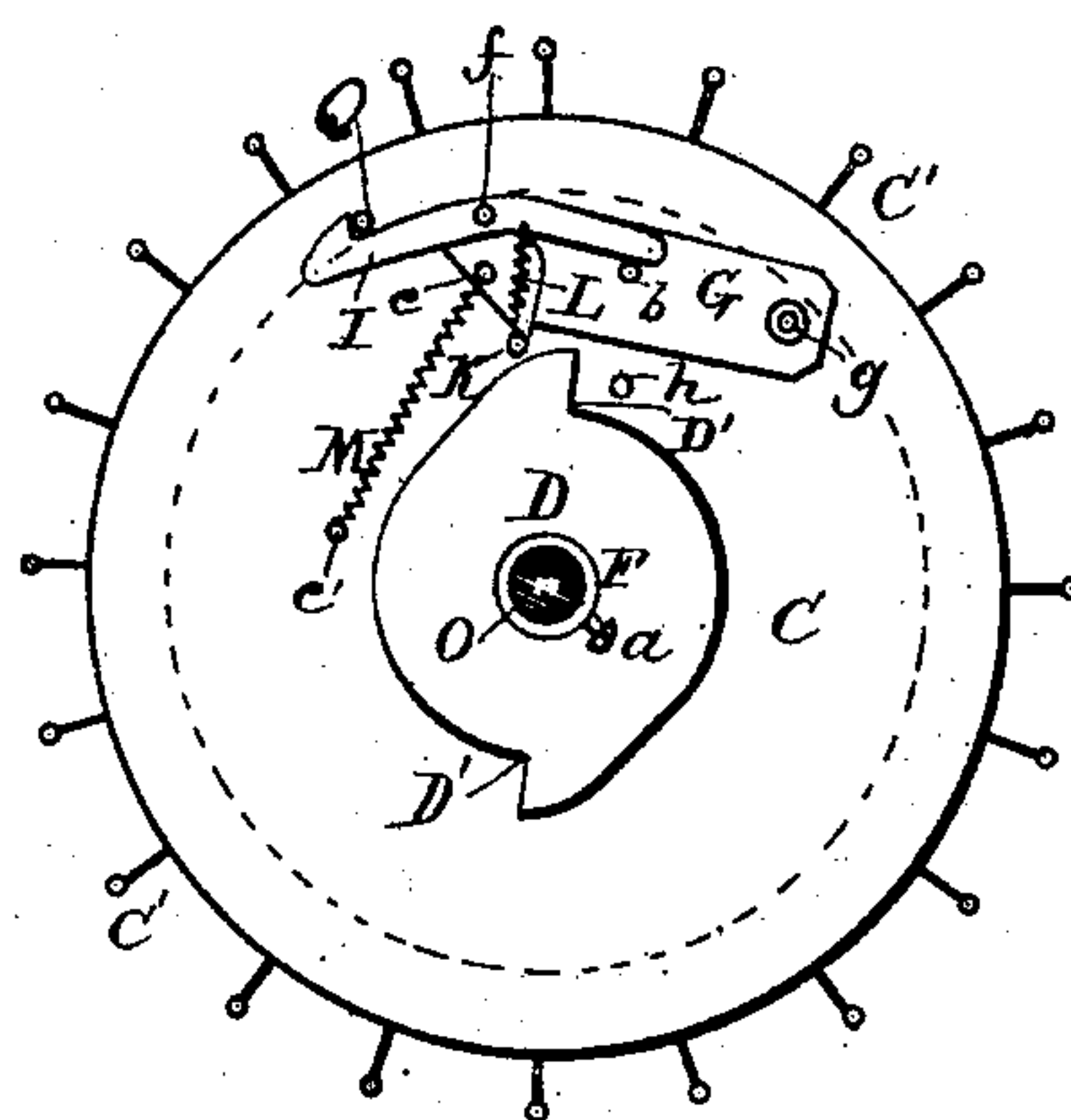


Fig. 3.

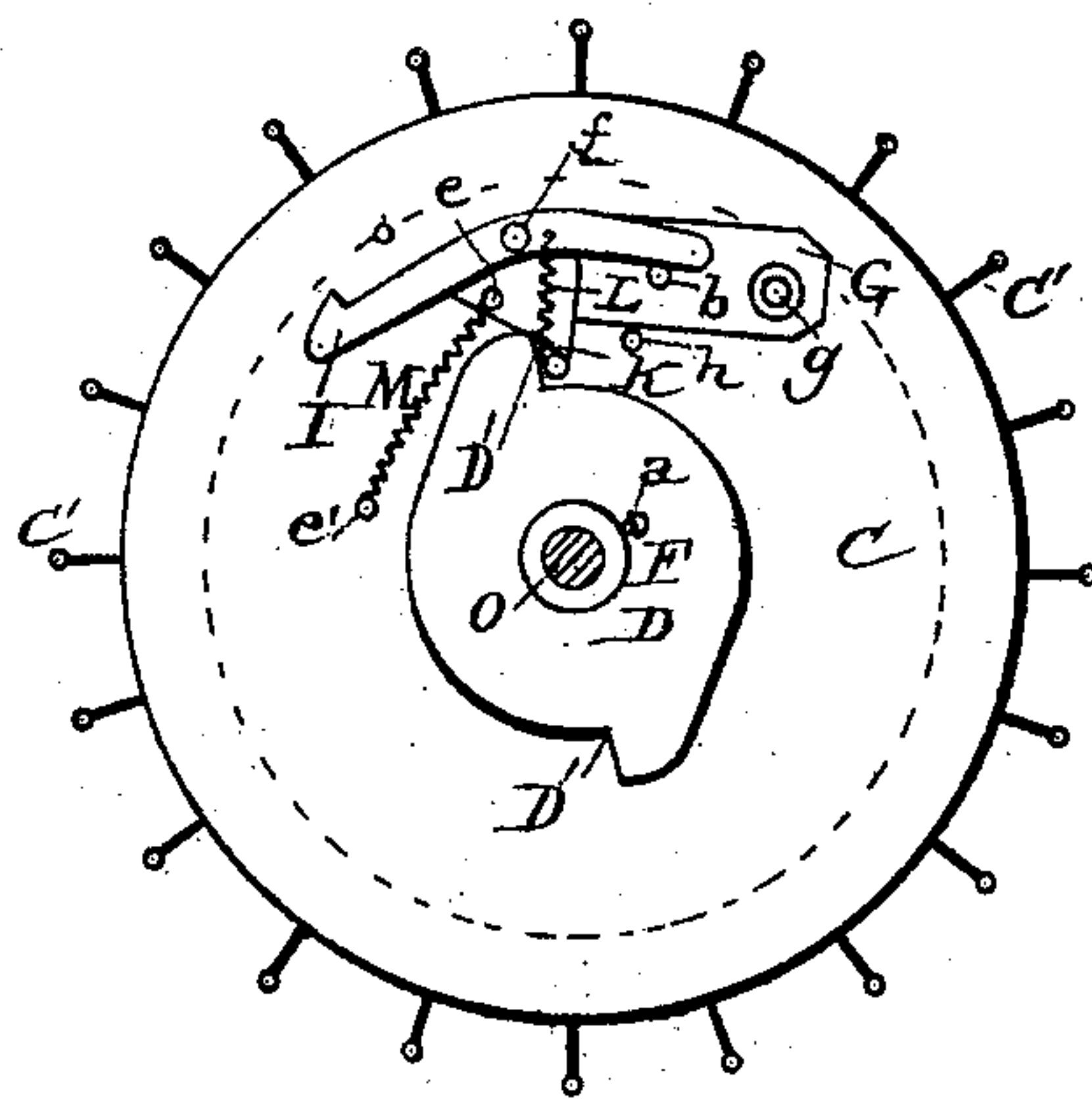


Fig. 4.

Witnesses:

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Inventor:

*Fred. L. Bancroft.*

by

*Haupt & Borthen*

ATTORNEY.

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2 Sheets—Sheet 2.

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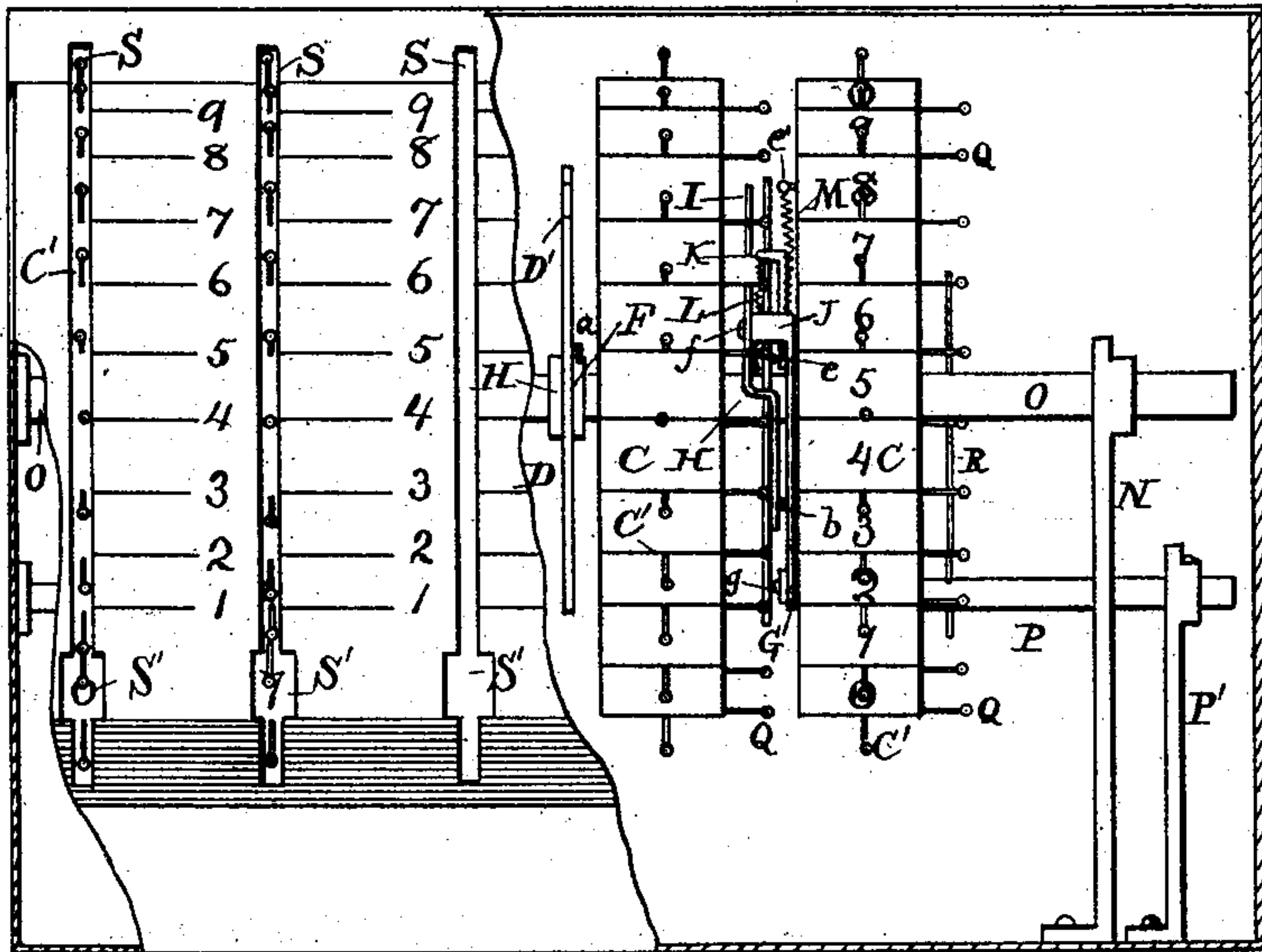
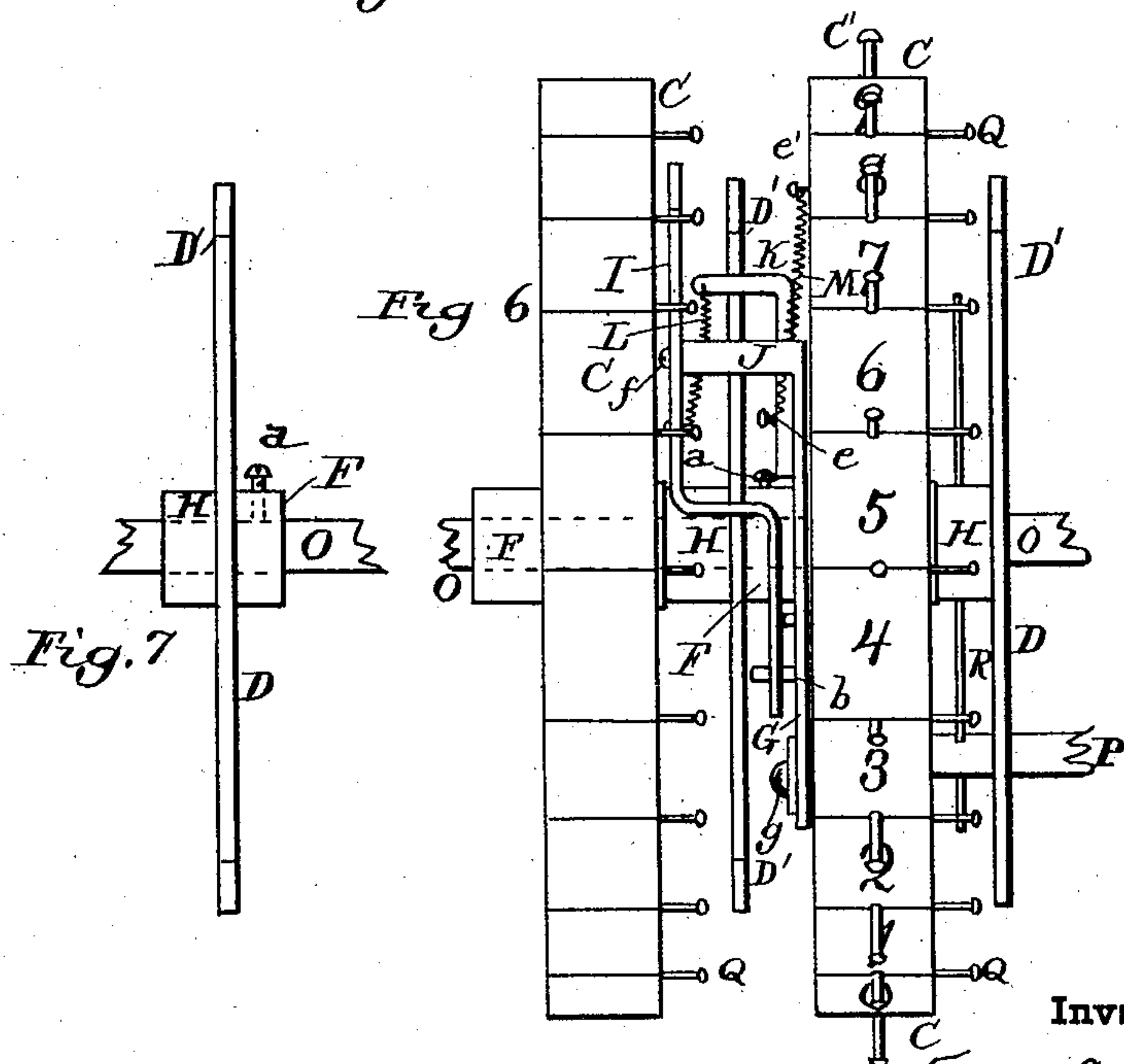


Fig. 5.



Witnesses:

H. Haupt Jr.  
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Inventor:

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by

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# UNITED STATES PATENT OFFICE.

FREDERICK L. BANCROFT, OF ST. PAUL, MINNESOTA.

## CALCULATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 377,823, dated February 14, 1888.

Application filed August 19, 1887. Serial No. 247,388. (No model.) Patented in Canada July 2, 1887, No. 27,113.

*To all whom it may concern:*

Be it known that I, FREDERICK L. BANCROFT, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented a new and useful Improvement in Calculators, (for which I have obtained a patent in Canada, No. 27,113, bearing date July 2, A. D. 1887,) of which the following is a specification.

My invention relates to improvements in calculators in which are arranged a series of parallel wheels, upon the periphery of which are placed numbers and arranged pins to correspond with the said numbers, with eccentrics and spring-pawls to operate the several wheels in conjunction the one with the other, the object of my invention being to provide a simple and efficient means for adding columns of numbers and at the same time keep the sum before the operator. I attain this object through the mechanism shown in the accompanying drawings, in which—

Figure 1 is an isometric view of the complete machine. Fig. 2 is a sectional view of the machine, showing the wheels illustrating the stop-pins. Fig. 3 is a view of a wheel, showing the eccentric D, showing the position of the pawl engaged with the pin of the next wheel. Fig. 4 is a view showing the eccentric D when the pawl is disengaged from the pins of the next wheel. Fig. 5 is a sectional view of the calculator, showing the relative position of the wheels and the columns of figures on the outside of the machine. Fig. 6 is an enlarged view of the wheels C, showing the construction of the mechanism for rotating the same in relation the one with the other. Fig. 7 is a plan view of the eccentric-cam D and shaft O.

Similar letters refer to similar parts throughout the several views.

I make a cylindrical box, A, having a rectangular base, with a part, B, projecting beyond the cylinder, which is adjusted so that the long axis is horizontal. The side of this cylinder A is slotted at convenient distances to allow the pins C' to project through these slots. At the lower end of the slot S is a widened space, S', made large enough to show the whole of a figure on the wheel C. In the part of the box B are slots B', which are opposite the slots in the cylindrical part of the box A, and are of equal width with the slots in the side of the box

A and long enough to allow the pins C' to pass through them readily.

On the front side of the cylinder A are marked a series of numbers commencing at the bottom of each slot and running from one (1) up to nine (9) in parallel rows with a line drawn to each slot toward the left. Two or more spaces at both ends of the cylinder are colored of a different color from the rest of the cylinder.

Within the cylinder I make a central shaft, O, suspended upon a hanger, N, and a socket at the other end of the cylinder. To this shaft I attach a series of wheels, C, at convenient distances and of any required number. Each wheel is marked on its periphery into twenty (20) equally distant places and numbered from one (1) to nine (9) and zero, (0,) there being two (2) sets of such numbers on the face of each wheel. On the line of demarkation of each number is inserted a pin, C', projecting outward in a radial line from the axis and of a convenient length. These pins C' are so placed that they project through the slots S in the cylinder A, and are so arranged that when a number shows at the lower end of the slot S at S' the pins will be opposite the line of the respective numbers on the side of the cylinder A.

On one side of the wheels C, I arrange in a circle twenty (20) pins, Q, at equal distance from each other, and so adjusted that they will engage with the end of the pawl I at the proper time, and they are also operated on the spring-stop R. These pins are so long that they will be engaged by the pawl I, but will not interfere with the rotation of the wheel on either side of it.

On the other side of the wheel C, I make a compound spring-pawl, which consists of a flat piece of metal, G, of a rectangular shape, pivoted to the wheel C at a convenient point by the screw and washer g, upon which it swings. About the middle of the pawl G is a pin, b, and at the end of the pawl farthest from the pivot q is a second pin, e, to which is attached the spiral spring M, which is attached to the pin e' at a convenient point on the side of the wheel C. At a convenient point on the pawl G is secured a bracket-arm, K, which is of an L shape, the longer arm being attached to the pawl G, and the shorter projecting out from it



at right angles. At the extreme outer end of this arm K is a spring, L.

From the upper part of the pawl G, at a convenient point, is an arm, J, projecting outward toward the next wheel of the series, and on the end of this arm is pivoted by the screw *f* a bent lever or arm, I, which at the end farthest from the pawl G has a hook, so constructed that it will engage the pin Q of the next wheel of the series. The end of the lever-arm I nearest the pawl G is slightly bent downward, and in the horizontal line it is bent in two directions, so as to bring the end of the arm I near the pawl G and over the pin *b*. The spring L is attached to the long arm of the lever I at a point back of the pivot *f*, and being secured at the other end to the arm. The arm K keeps the hook end of the lever I upward and the other end against the pin *b*.

On the shaft O, between each wheel of the series, is an eccentric-cam, D, having two cams at equal distances from each other, as D'. Between the cam D and the wheel C, on one side, is a collar, F, provided with a set-screw, *a*. This cam D and collar F are united securely together and held to the shaft O by the screw *a*. A second collar, H, which is loose upon the shaft O, serves to keep the two wheels at the same relative distances apart. The last wheel on the left-hand side of the series has no pawl G or cam D on it, as shown in Fig. 6.

Having thus described the parts of my machine, I now proceed to explain the method of operating the same.

I place the finger upon the pins of each wheel separately and pull the pin C' downward until the numbers showing in the slots S' are all zero. To add any number, I read off the number, commencing with the first left-hand figure, and, putting my finger on the pin corresponding to that number, I bring it down to the board B, or until it shows at the slot S'. I then read the next figure to the right hand and bring it down with the finger in the same way to the board B, and so on to the end of the numbers to be added. In this way, when I have carried any one wheel over nine (9) figures of the disk, the arm K, which rides over the edge of the cam D, has reached the summit of the cam D and brings the hub end of the lever I upward, and it, the lever I, engages with the pin Q of the next left-hand wheel of the series, and the next movement of the given or initial wheel moves the second wheel, by means of the pin Q, one figure, and as the cam D is rigidly fixed to the shaft O and cannot move, the arm K

passes over the summit of the cam and drops down by means of the spring M into the notch D' and against the pin *h*, which lowers the hub of the lever I, so that the pins Q of the wheel C are not engaged by it until it has passed the half of a circle or nine figures, when it is again brought in position to move the next wheel, as stated. Thus, in reading off the numbers to be added the movement of a certain wheel, C, over nine (9) figures will at the next stroke move the wheel next to the left one place. To prevent the wheels C from slipping back, I use the spring-stop R, which is a curved spring, and made to fit between two (2) of the pins Q of the wheel, and while it will allow of free motion in one direction retards it in another, and is so constructed that the pins C' of the wheel C are always opposite the lines on the cylinder A. To adjust these springs R, of which there is one to each wheel, I loosen the set-screw *d* on the shaft P, which shaft is supported by the standard P' on a socket in the end of the box A.

I am aware that prior to my invention calculators having revolving disks and numbers upon their faces have been invented and used, and I do not, in view of this state of the art, lay claim to the broad principle of disk-calculators therefor; but

What I do claim, and desire to secure by Letters Patent of the United States, is—

1. In a calculating-machine, the eccentric-cam D, shaft O, collar F, and set-screw *a*, combined with the pawl G, pivot *g*, arm K, spring L, pin *b*, lever I, pivot *f*, spring M, pin *e* and pin *e'*, with the wheels C, pins C', and pins Q, all arranged and operating substantially as set forth and described.

2. In a calculating-machine, the numbered wheel C, pins C', pin Q, and shaft O, combined with the eccentric D, pawl G, lever I, arm J, arm K, and springs M and L, all arranged and operating substantially as set forth.

3. The calculating-machine consisting of a cylinder, A, with a numbered cover-plate colored in desired colors, with slots S and S', board B, slots B', the wheel C, with numbers and pins C' on the periphery, the pins Q, pawl G, pivot *g*, arm K, lever I, pivot *f*, pins *b*, *e*, and *e'*, springs L and M, cam D, shaft O, collars F and H, pin *h*, the shaft P, spring R, and set-screw *a*, all arranged as set forth and described.

FRED. L. BANCROFT.

In presence of—

H. HAUPT, Jr.,

S. N. WHITNEY.