

(No Model.)

2 Sheets—Sheet 1.

G. PHILLIPS.
ADDING MACHINE.

No. 367,546.

Patented Aug. 2, 1887.

Fig. 1. A

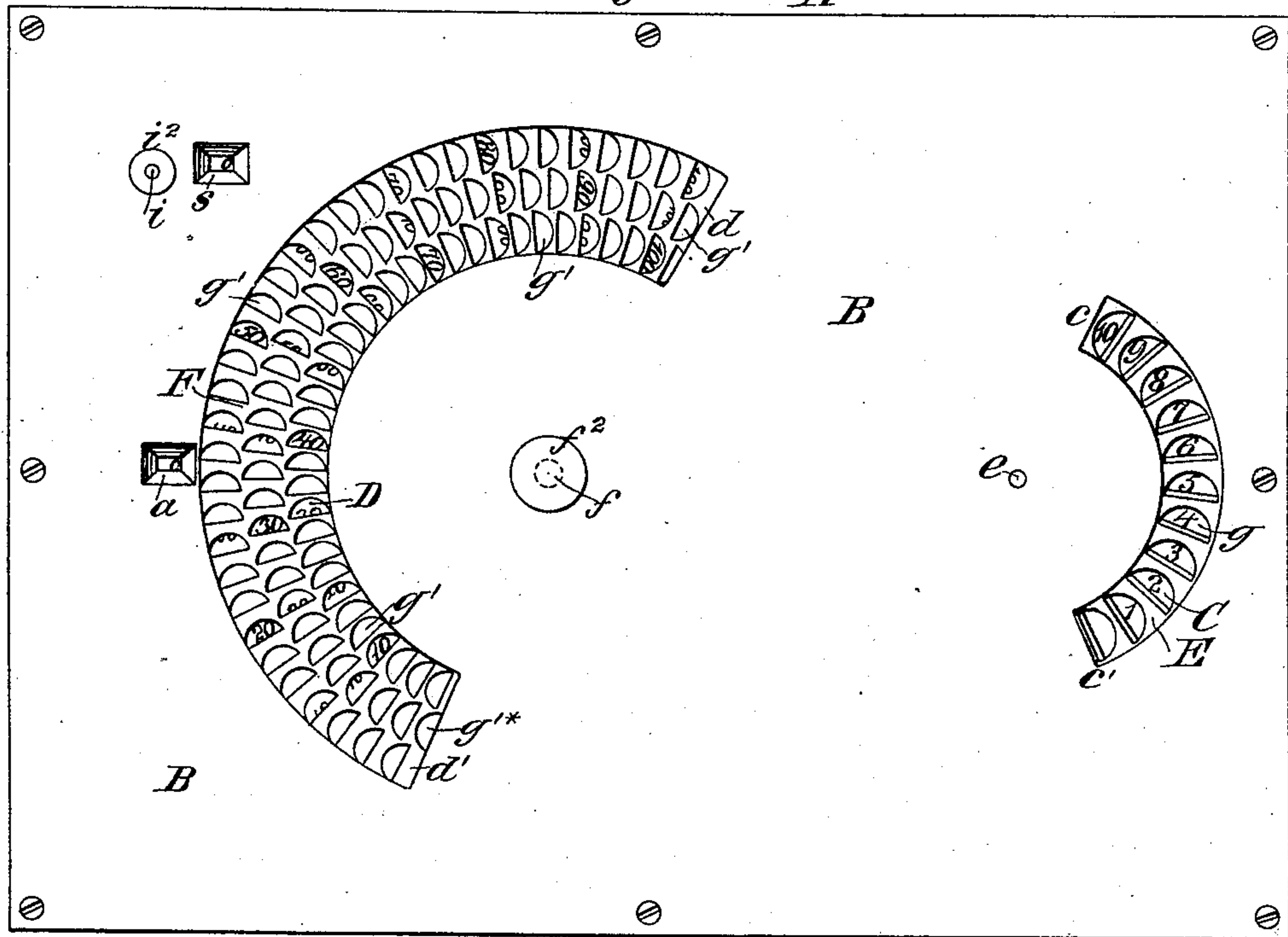


Fig. 2.

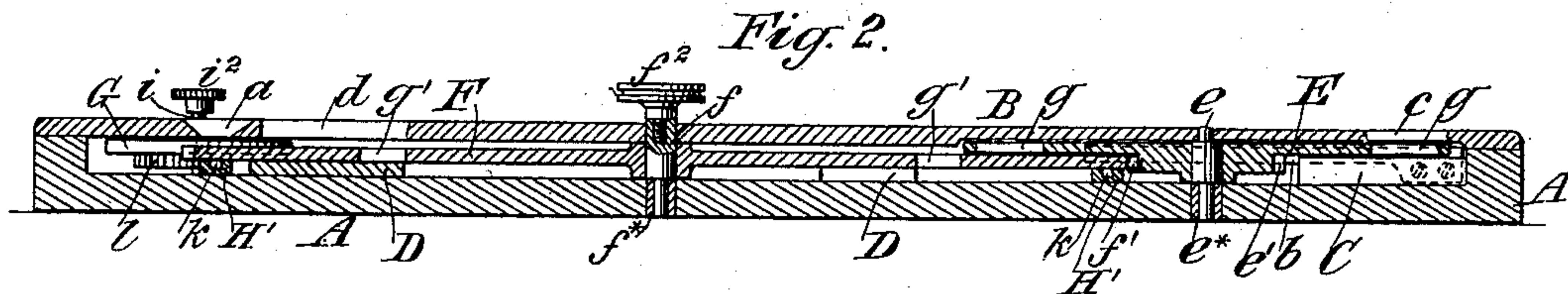
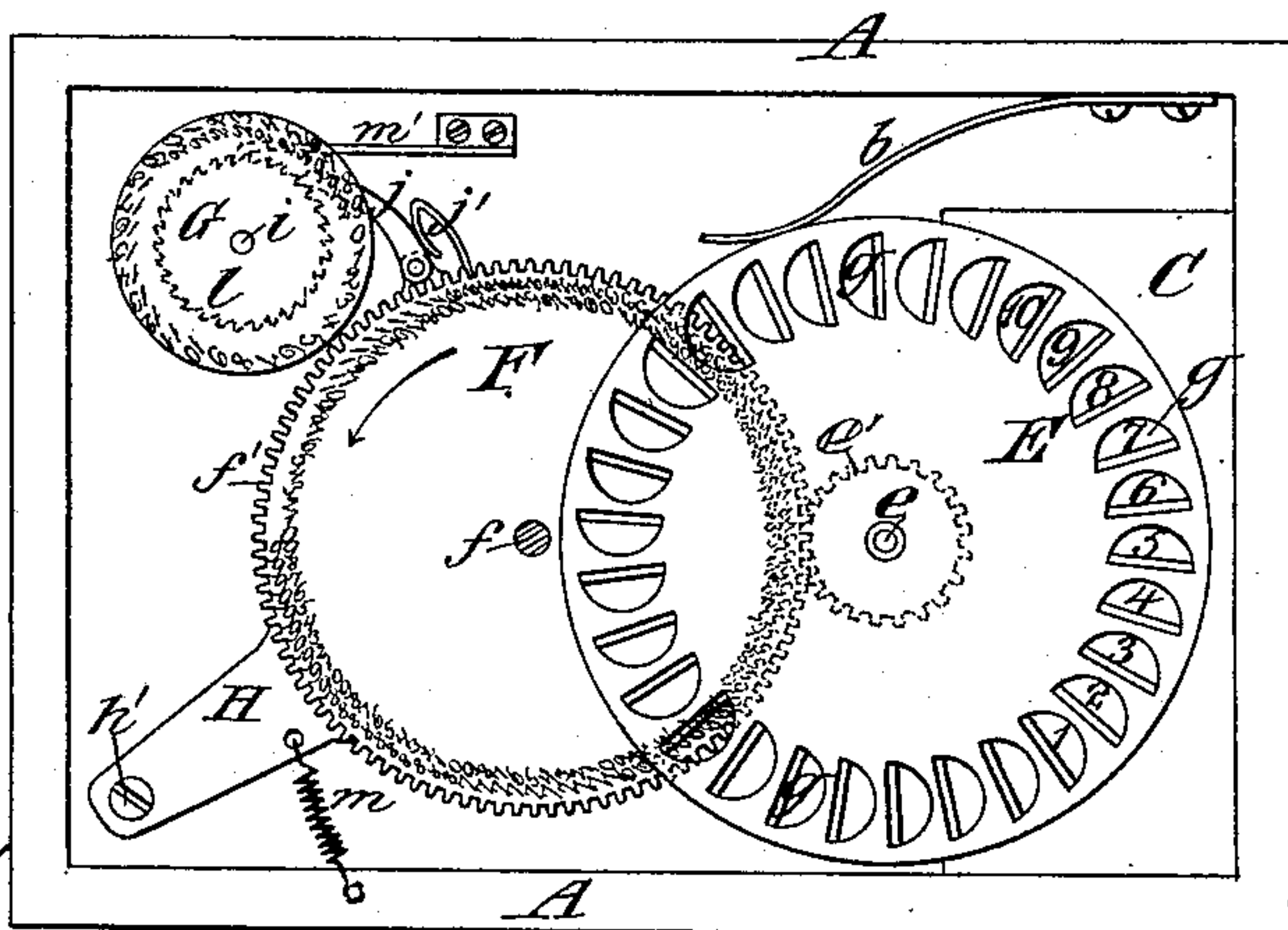


Fig. 5.



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2 Sheets—Sheet 2.

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Fig. 3.

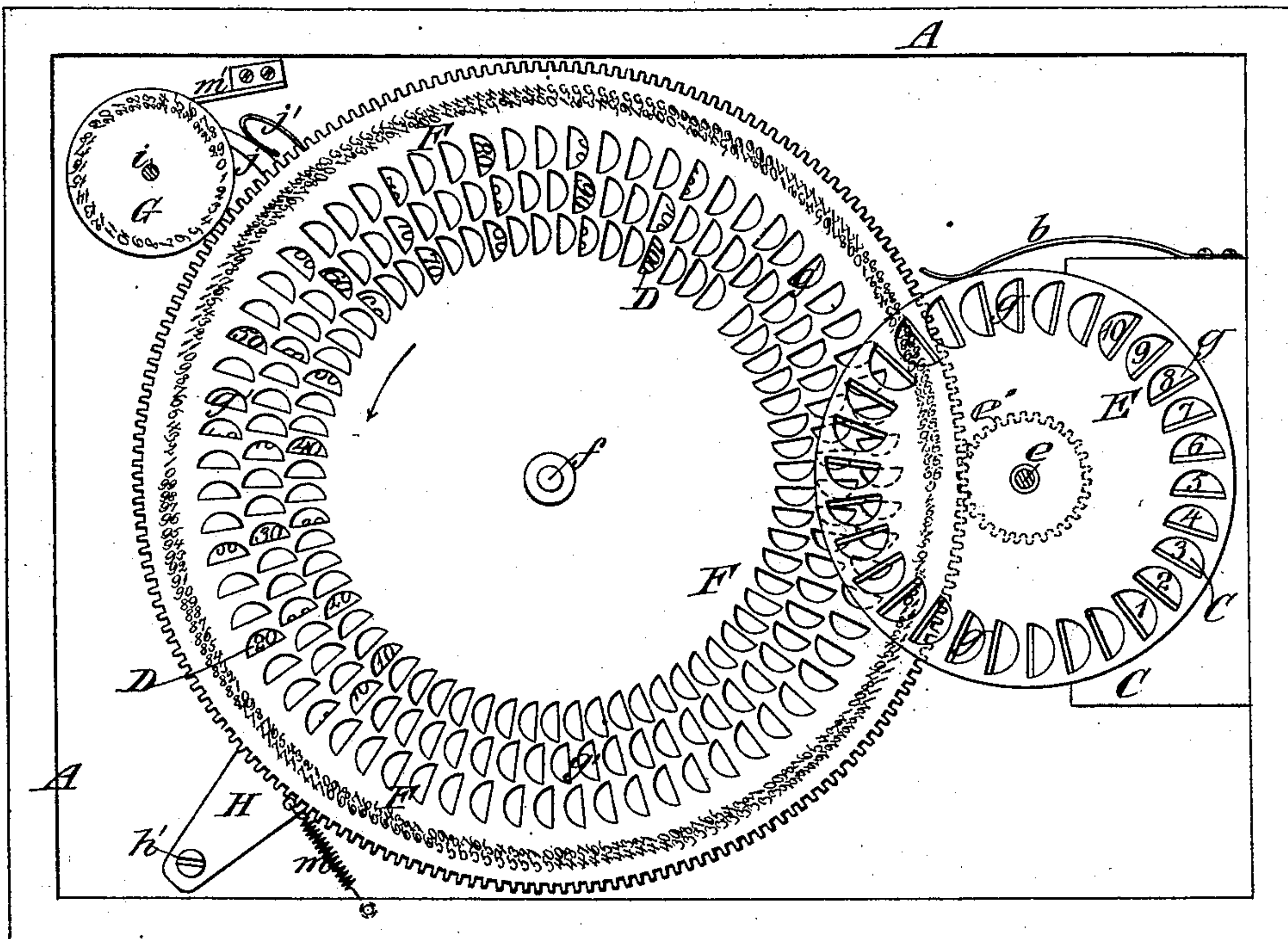
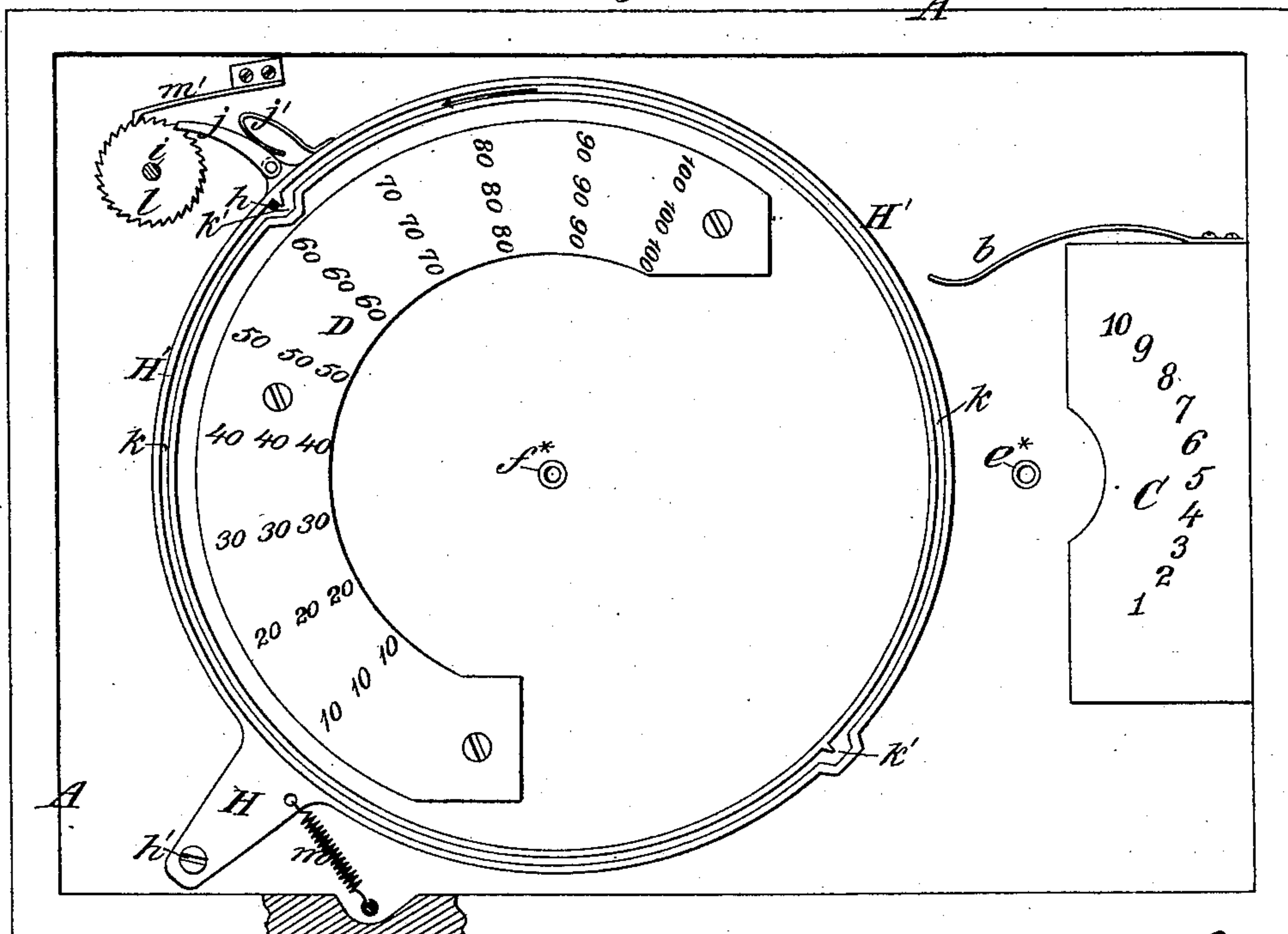


Fig. 4.



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UNITED STATES PATENT OFFICE.

GEORGE PHILLIPS, OF BROOKLYN, NEW YORK.

ADDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 367,546, dated August 2, 1887.

Application filed November 23, 1886. Serial No. 219,625. (No model.)

To all whom it may concern:

Be it known that I, GEORGE PHILLIPS, a subject of the Queen of Great Britain and Ireland, residing in the city of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Adding-Machines, of which the following is a specification, reference being had to the accompanying drawings.

10 The object of my invention is to provide an adding-machine which, while of conveniently small dimensions, presents all the numbers on the dials and numerator-wheels to view with perspicuity, is free from delicate mechanism, and can be operated by the human fingers without the need of a separate instrument; and to this end my improvement consists in certain combinations of numerator-wheels, adding-wheels, and a casing for the same having openings in the front thereof, and in the novel construction of certain of the wheels, hereinafter described and claimed.

Figure 1 of the drawings is a front view of an adding-machine for adding two columns at a time, illustrating my invention. Fig. 2 is a longitudinal section of the same through the axes of its numerator-wheels. Fig. 3 is a front view of the interior of the machine, the cover of its case or frame only being removed. Fig. 4 is a front view of the case or frame without either the cover or the adding and numerator wheels for units and tens, but showing the dials, the wheel for counting hundreds, and the principal parts of the mechanism for operating the latter wheel. Fig. 5 is a view corresponding with Fig. 3 of a simpler machine for adding only one column at a time and embracing a portion only of the invention.

40 Similar letters of reference indicate corresponding parts in the several figures.

A designates a shallow box having a cover, B, the said box and cover constituting the case or framing which contains within it the principal working parts of the machine. In the interior of the back or bottom of the box A are two dials, C and D, of arc form, of which C is equal to one-third of a circle and is divided into ten equal divisions, numbered from 1 to 10, representing units. D is equal to a half-circle and is divided into ten equal di-

visions, numbered from 10, 20, 30, &c., to 100, and representing tens. The face of the dial D is wide enough for each of the divisional numerals which indicate the number 10 and multiples thereof up to 100 to be repeated several times on a radial line, as shown in Fig. 4, where there are three repetitions. In the front or cover B of the box is an arc-shaped opening, *c c'*, opposite to and corresponding with the dial C, and another arc-shaped opening, *d d'*, opposite to and corresponding with the dial D, the arcs of the said openings being each a little larger than the arc of its respective dial, to leave room at the ends of the openings for the fingers of the operator in operating the adding-wheels E F, as will be hereinafter described.

E designates the units-adding wheel, arranged within the case and having its arbor *e* arranged in a bearing, *e**, provided in the latter concentric with the dial C, and having applied to its periphery a friction-brake, *b*, to prevent the machine from moving farther than is desired whenever it is turned for adding.

F designates the first numerator-wheel, arranged within the case and having its arbor *f* arranged in a bearing, *f**, provided therein concentric with the dial D. In the example of my invention shown in Figs. 1, 2, 3, 4 the numerator-wheel F serves the additional purpose of an adding-wheel for tens as well as a numerator-wheel; but in the example shown in Fig. 5 the said wheel F is only a numerator-wheel, as will be hereinafter more fully explained. The said wheels E F are geared together by toothed gears *e' f'*, the latter being represented on the periphery of the wheel F itself. The numerator-wheel F has upon its face a circular series of equally-spaced divisions, which may number one hundred or any multiple thereof, having the numerals from 0 to 99 inscribed thereon, this numeration being repeated when there is more than one hundred. In the example of the invention represented in Fig. 5 the said wheel has one hundred divisions and numerals, and in the example represented in Figs. 1, 2, 3, 4 it has two hundred divisions. There is an opening, *a*, in the front or cover B, as shown in Figs. 1 and 2, through which one of these numerals at a time may be seen.

The relative number of teeth in the gears e' and f' is immaterial, except that it should be such that while the wheel E turns a distance equal to one of the ten divisions of the dial C the wheel F turns a distance equal to one of its own centesimal points. In the example represented in Figs. 1, 2, 3, 4 the gear e' has thirty teeth and f' has two hundred. In the example Fig. 5 the gear e' has thirty and f' one hundred teeth.

The wheels E and F, it will be seen, are entirely within the casing. The wheel E in both examples is interposed between the dial C and corresponding opening, c and c' , in the case, and in the example, Figs. 1, 2, 3, 4, the wheel F is interposed between the dial D and the corresponding opening, d and d' , in the case.

The unit-adding wheel E has in it, arranged in a circle, a number of equally-spaced holes, g , for the reception of the tip of one of the fingers of the operator for moving the said wheel for adding units. These holes present themselves between the dial C and the corresponding opening, c and c' , of the case, so that the numbers on the said dial may be seen through the said opening c and c' and through the holes g , the whole ten numbers of the said dial being visible through the opening c and c' , and one being visible through each of the holes g .

To add units, the operator places the point of his finger through the opening c and c' in the front of the case and into the hole g opposite the numeral on the dial C, representing the first number of units to be added, and moves it down to the end c' of the said opening, where it is arrested, and by this means the numerator-wheel F is moved the distance of a number of its centesimal points or divisions and the number is indicated by the numeral opposite the hole a . To add the next number, this operation is repeated by inserting the finger in the hole g of the wheel E opposite the corresponding numeral on dial C, and so on for any number of figures in a column; but this wheel will only add units to one hundred, and hence the wheel F, which may be termed the "first" numerator-wheel, is geared with a second numerator-wheel, G, whose arbor i has its bearings in the case. This wheel G may be of any size. It has a circle on its face divided into any number of equal parts, numbered 0, 1, 2, &c., up to the whole number of the divisions, one of the numerals being visible through a hole, s , in the cover or front B of the case, the gearing between F and G being such that the said wheel G will move a distance equal to one of said divisions every time the first numerator-wheel, F, has moved a distance equal to one hundred of its divisions.

The means which I propose commonly to employ for producing the movement of the second numerator-wheel, G, consists of a pin, h , secured in the first numerator-wheel, F, and projecting from the back thereof, a swinging yoke, H and H', arranged behind the said wheel and pivoted by a pin, h' , to the back of the

casing, a pawl, j , pivoted to said yoke, and a ratchet-wheel, l , which is secured to the back of the said wheel G, and with which said pawl is held in engagement by a spring, j' , attached to the yoke. The number of teeth in the ratchet-wheel corresponds with the number of divisions of the wheel G. A part, H', of the said yoke is of annular form and has in it a groove, k , which receives the pin h on the wheel F. This groove is a true circle, except that it has one or more offsets, as shown at k' in Fig. 4. While the pin h is in the circular part k of the groove it holds the pawl j stationary, so that it cannot operate the ratchet-wheel l to turn the second numerator-wheel, G, yet it allows the first numerator-wheel, F, to turn freely in the direction of the arrows shown on said wheel in Figs. 3 and 5 and upon the yoke in Fig. 4. The tongue, which constitutes the outer side of each said offsets k' , has one side radial or abrupt, so that it will serve as a stop to the pin h , as shown in the upper left-hand corner of Fig. 4, and prevent the wheel F from turning backward farther than to allow one of its zero-points to arrive opposite the opening a in the case, and hence it provides for the said wheel F being always set to the zero-point before commencing to add, by turning the wheel backward by means of a knob, f^2 , provided on the arbor f , outside the cover B, or front of the case. The opposite side of the said tongue is beveled, as shown in Fig. 4, so that while the wheel F is moved the distance of one of its centesimal divisions a forward direction from the position presenting a numeral, 99, at the said opening a to a position to present a zero-point, 0, at the said opening the said pin operating on the said beveled side moves the said yoke far enough for the attached pawl j to turn the ratchet-wheel l one tooth and no more, the second numerator-wheel, G, a distance of one division to present a new and higher number at the opening s , and show that the last addition has carried the sum to or beyond a hundred.

The yoke might be drawn back to bring back the pawl j over one tooth by the action of the pin h in the offset k' ; but to produce a more prompt return a spring, m , is applied to the yoke. A spring-pawl, m' , is applied to the ratchet-wheel to hold the wheel G with its numeral opposite the hole s , and a knob, i^2 , is provided on the arbor i outside the case, for the purpose of setting the said wheel to zero by hand.

The number of offsets k' on the yoke will be equal to the number of hundreds of divisions on the first numerator-wheel, F. It will be seen that in the example of the machine shown in Figs. 1, 2, 3, 4, with two hundred divisions on the wheel F, there are two offsets, so that the operation takes place twice during each revolution of the said wheel. In the example shown in Fig. 5, there being only one hundred divisions on the wheel, it is obvious that but one offset in the yoke would be necessary.

So far I have only described the two examples of my invention in detail in so far as they are adapted to adding units or one column of figures at a time, for which purpose both are operated precisely alike by means of the units-wheel E, as described, the simpler example, Fig. 5, not being capable of any other operation. I will now further describe the example shown in Figs. 1, 2, 3, 4 to explain the operation for adding two columns. This last-mentioned machine has the dial D and the corresponding opening, $d d'$, in the front of the case, neither of which is in the simpler example, and its first numerator-wheel, which is also an adding-wheel, has in it a series of finger-holes, g' , which are like the holes g in the adding-wheel E, and through which and the opening $d d'$ the numbers indicating tens on the dial D are visible. In order to provide a number of holes corresponding with the number of divisions of the dial and large enough to receive the tip of the finger without making the wheel very large, the said holes, instead of being arranged all in one circle, each one ranging with one of the centesimal numbers on the wheel, are arranged in several concentric circles, three in the example represented, corresponding with the repetition of the tenth numbers 10, 20, 30, &c., on the dial D, and when, as for example, the hole g'^* in Fig. 1 comes just in front of the lower end, d' , of the opening $d d'$, which end serves as the finger-stop, one of each of the several tenth numbers 10, 20, 30, &c., will appear precisely opposite one of the said holes.

To add tens, a finger is inserted in the hole which exposes fully to view the tens-number to be added.

In adding two columns with a machine like the one shown in Figs. 1, 2, 3, 4, the first or units column may be first added by operating on the wheel E, and the sum of the units, if less than one hundred, will appear through the hole a , and if more than one hundred the hundred or hundreds will appear through the hole s and the tens and units through the hole a . The second or tens column is then added by operating on the wheel F, and the sum will always be visible through the hole a or the holes $a s$, as just described.

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

1. The combination, with the casing or frame having a dial in the back part thereof and an opposite corresponding opening in the front thereof, of an adding-wheel interposed between said dial and opening and having finger-holes spaced to correspond with the numbered divisions on the dial and through which the numbers of said divisions are visible through the opening in the front of the case or frame, substantially as herein described.

2. The combination, in an adding-machine, of an adding-wheel having finger-openings arranged in two or more concentric circles, and a dial in rear of and visible through said finger-openings and having its divisional numerals repeated two or more times on radial lines to correspond with the number of said circles in which the openings are arranged, substantially as and for the purpose herein set forth.

3. The combination of the units-adding wheel E, having finger-openings g , by which to turn it, the tens-adding wheel F, geared with said units-adding wheel and having finger-openings g' , by which to turn it, and having on its face centesimal divisions of a casing having openings $c c'$ and $d d'$, through which the said wheels are visible, and having also an opening through which is visible one of the centesimal divisions of said wheel F, all substantially as herein described, whereby the said wheels may be separately used for adding columns of units and tens, as herein set forth.

4. The combination, with the numerator-wheels F and G, of the pin h , carried by said wheel F, the ratchet-wheel l , attached to said wheel G, the swinging yoke H H', having the circular groove k and offsets k' , receiving said pin h , and the pawl j , attached to said yoke and engaging with said ratchet-wheel l , all substantially as herein described, and for the purpose herein set forth.

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