

No. 825,365.

PATENTED JULY 10, 1906.

F. R. WELTON.
ADDING MACHINE.

APPLICATION FILED NOV. 3, 1903.

2 SHEETS—SHEET 1.

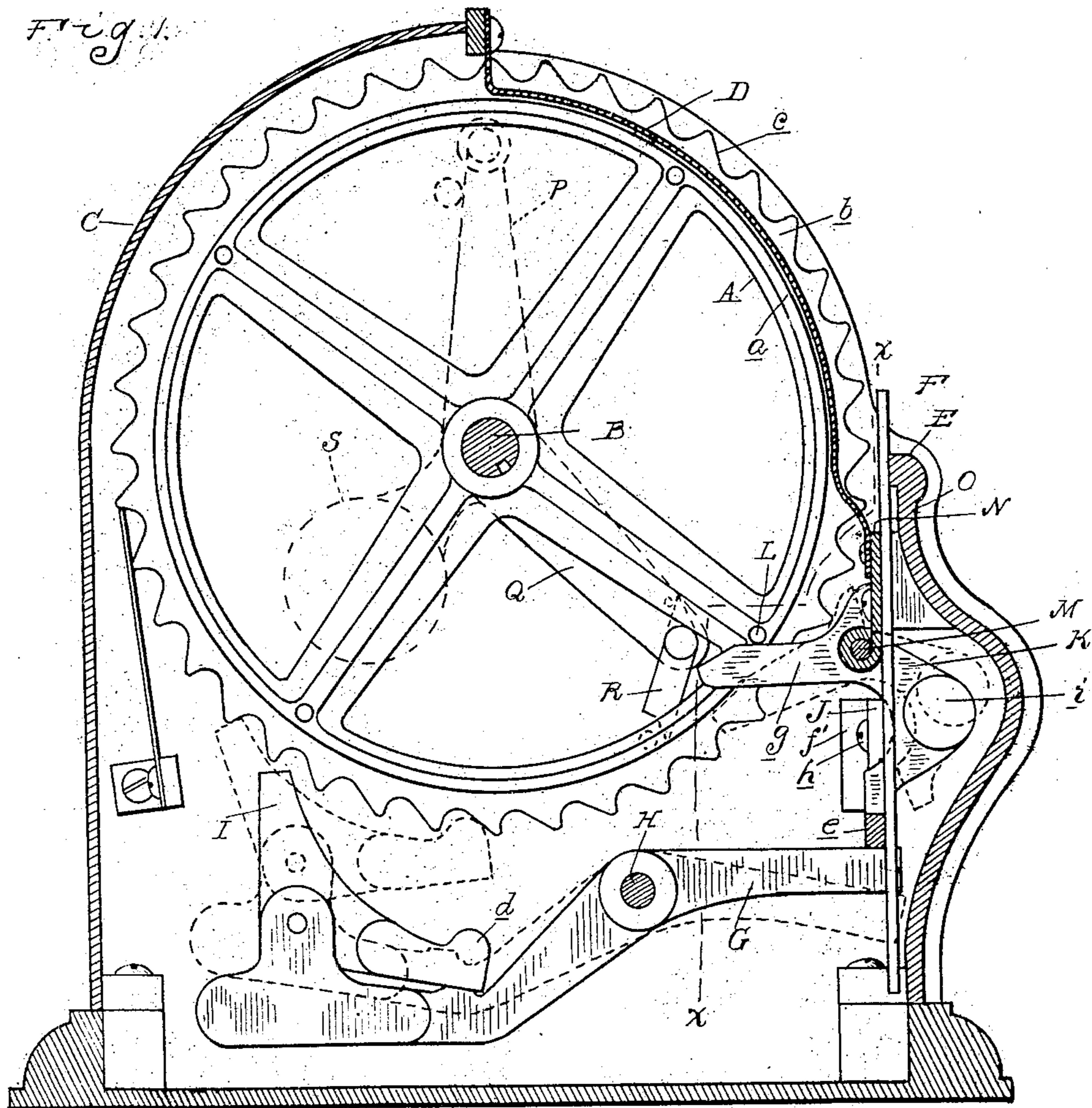
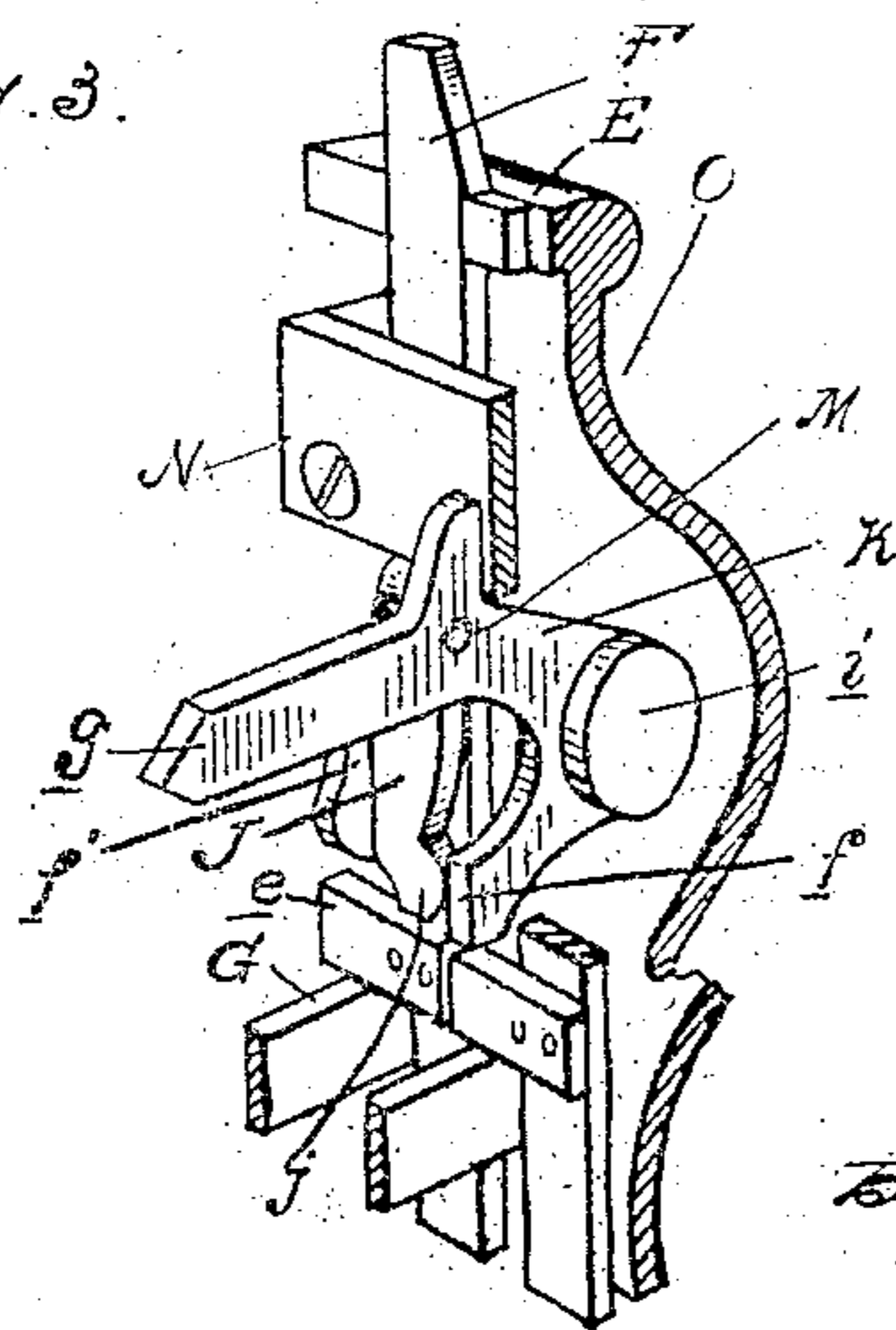


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 4.

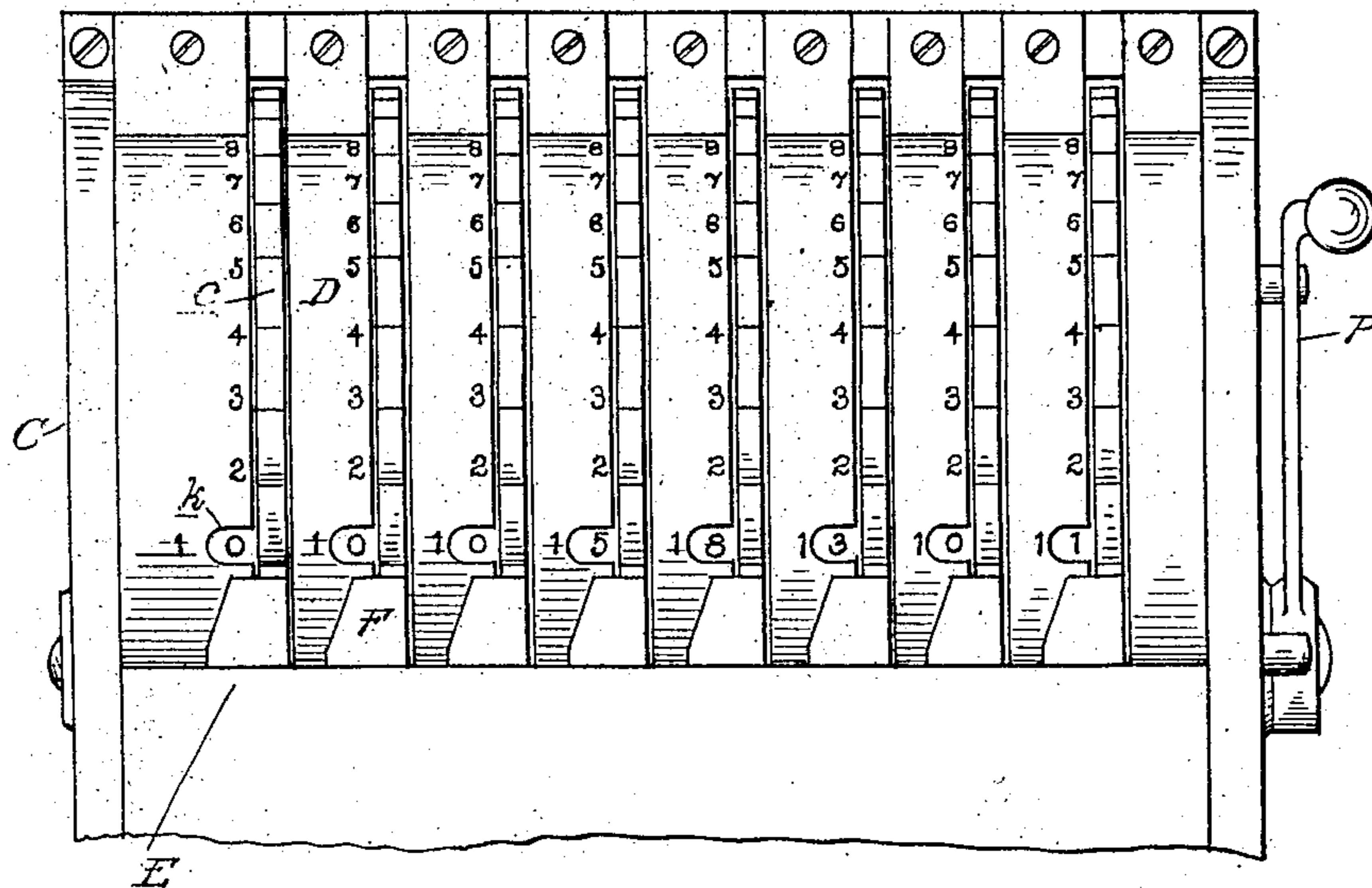
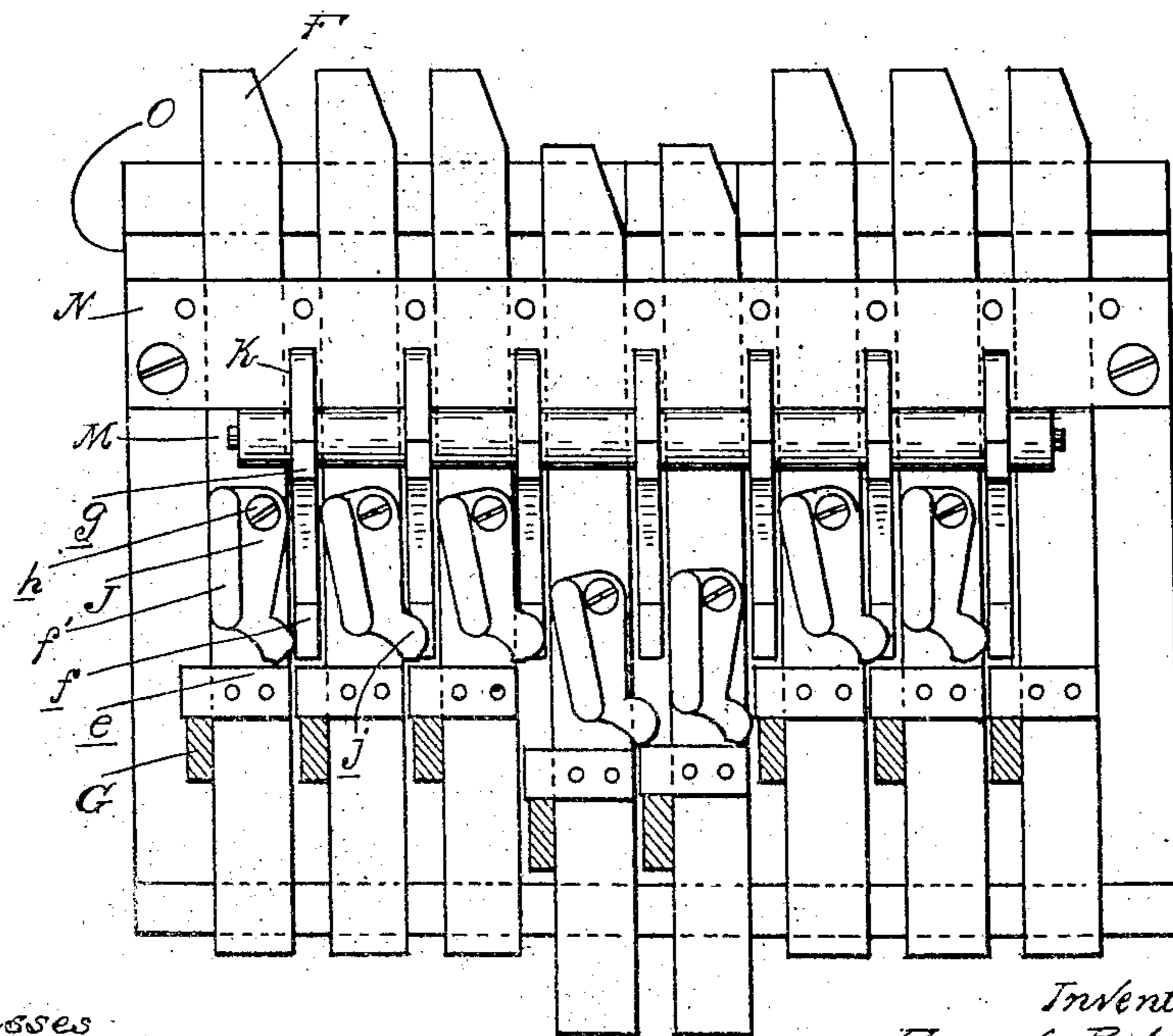


Fig. 2.



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ADDING-MACHINE.

No. 825,365.

Specification of Letters Patent.

Patented July 10, 1906.

Application filed November 3, 1903. Serial No. 179,623.

To all whom it may concern:

Be it known that I, FRANK R. WELTON, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Adding-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to adding-machines; and it consists in the novel construction, arrangement, and combination of parts, as hereinafter set forth.

In the drawings, Figure 1 is a cross-section through the machine. Fig. 2 is a detail view on line *x x*, Fig. 1. Fig. 3 is a perspective view of a portion of the carrying mechanism. Fig. 4 is a front elevation of the machine.

A represents the counters, which are preferably in the form of wheels sleeved upon a shaft B, extending longitudinally through the case C. As shown, each of the wheels is provided with a flange *a*, on which the digits are arranged, and the wheel may be provided either with a single-series of digits equally spaced around the flange or preferably several series arranged successively. In the construction shown the wheel is formed for four complete series of digits, each occupying a quadrant of the flange.

The counters A are provided with means for variably actuating the same, preferably consisting of a notched peripheral flange *b*, forming a series of finger-bearings *c* adjacent to each of the digits. The casing C is constructed so that the bearings *c* for one series of digits project outward through a slot into a position where they may be operated to turn the wheel. As shown, the front of the case is provided with a slotted quadrant D, and upon the sections of this quadrant, intermediate the slots, are marked a series of digits opposite the bearings *c*. Thus any one of the counters may be operated by placing a finger in the bearing *c* opposite the proper digit and drawing downward on the wheel until the limit of movement is reached. This limit is preferably formed by a ledge or shoulder E on the case.

Each of the counters A is provided with a carrying mechanism by which the wheel of next higher denomination is actuated. This mechanism is not directly actuated by the movement of the corresponding counter or its actuating means; but the arrangement is

such that each counter controls the carrying to the wheel of next higher denomination, while the carrying mechanism is actuated by separate means. In the construction shown F represents actuating members for the carrying mechanisms, each of which is arranged adjacent to and in front of the flange *b* on its corresponding counter A and extends downward through bearings on the case. In normal position these actuating devices project above the shoulder E, so that whenever the corresponding counter is actuated by the engagement of a finger with one of the bearings *c*, the operator's finger will also strike against the actuating device F before completing the movement. Thus the said member will be depressed simultaneously with the final movement imparted to the counter.

Each actuating device F has an operating connection with a pawl, which when operated engages with the notched bearings of the corresponding wheel. This, as shown, consists of a lever G, fulcrumed upon a cross-bar H. The front end of said lever lies in the path of the lug *e*, secured to member F, and the rear end has pivotally secured thereto a pawl I. In normal position this pawl is arranged to clear the notched flange *b*; but whenever the front end of the lever G is tilted down under the actuation of the member F the pawl I will engage with one of the notched bearings *c* and will turn the counter a distance equal to the space between adjacent bearings *c*. The pawl I is also provided with a forwardly-extending arm *d*, which during the movement of the pawl is tilted upward and strikes against the flange *b*, thereby arresting further movement of both the pawl and the counter-wheel.

It will be noticed that in the mechanism just described the actuating member F adjacent to each counter operates the lever and pawl for the same counter, and as a consequence this mechanism alone does not carry between counters. The carrying is effected by coupling the pawl-actuating mechanism of one counter with that of an adjacent counter of the next higher denomination. This is preferably accomplished by providing each of the members F with a dog J, pivoted thereto and adapted to engage with a shoulder *e* on the next adjacent member F. These dogs are, however, normally held from such engagement by fingers *f* of the levers K, which are pivotally secured within the case and in normal position have their fingers *f*

projecting between adjacent members F, so as to hold the dogs J from contact with the shoulder *e*. The fingers *f* are operated by actuating-arms *g*, which extend adjacent to the corresponding counter-wheel and into the path of lugs or pins L on said wheel arranged between adjacent series of digits. Thus whenever one of said pins L by engaging with the arm *g* moves the finger *f* out of the path of the dog J, which occurs whenever "9" appears at the opening K, said dog will engage with the shoulder *e* of the next higher member F, with the result that the next higher number F will be depressed simultaneously with the depression of the member F corresponding to the counter.

If the number shown through the openings *k* is "979998," the second, third, fourth, and sixth arms *g* counting from the left in Fig. 2 and from the right in Fig. 4 will be depressed, and the second, third, and sixth members J will have been permitted to swing over the lugs *e* of the next higher members F. Depressing the fourth member F, as in Fig. 2, would cause the fifth member to go down with it, causing the fifth counter to move one step at the final movement of the fourth counter and its member F. If, instead of the fourth counter being actuated, the sum of two be added to the first counter, thereby turning the wheel and causing one of its pins L to depress its finger *f*, and thereby release its dog J, the depression of the member F would cause the units-dog J to depress the tens member F, its dog would depress the hundreds member F, its dog would depress the thousands member F, and its dog would depress the ten-thousand member F. The members F of the units, tens, hundreds, thousands, and tens thousand would move together and their counter-wheels would turn together, and the number shown through the openings *k* would be changed from "979998" to "980000." All this setting of the dogs J is done as the lowest counter-wheel passes a figure "9" past the opening *k*, and as the figure "0" of the lowest counter passes its opening *k* the tens are transferred.

It is one of the objects of the construction to avoid the use of springs, which are liable to get out of order and cause inaccurate operation. To this end the pawl I and finger *f* are constructed to return to normal position by gravity. The dog J is also actuated by gravity to move into a position for engaging with the shoulder *e* of the adjacent member F. Again the actuating members F are returned by the gravity of the outer ends of the levers G and the pawls I thereon. More specifically the dog I has its dog *d* sufficiently weighted to assume the position shown in full lines in Fig. 1. The dog J is provided with the weight *f'* on one side of its pivot *h*, and the lever K has the counter-

weight *i* thereon for holding and returning it to normal position, where the arm *g* extends into the path of the pin L and the end *j* of the dog has passed below the finger *f*. The levers K are preferably pivotally secured upon the shaft M, which is secured in bearings N to the frame O, in which the members F are slidably secured. The dogs J have a rounded portion *j* for projecting into engagement with the shoulder *e*, so that in the return movement of the members F said dogs will be automatically disengaged from said shoulders by again contacting with the corresponding finger *f*.

With the mechanism constructed as shown and described in operation any one of the counters may be actuated for any number from "1" to "9" where there is but a single series of digits upon the wheel-flange or where there are four series, as in the preferred construction, each counter may be actuated for any number from "1" to "36." In this movement the counter is turned the proper distance, and at the end of the movement the member F is operated as before described to actuate its corresponding lever H and pawl I. If the finger *f* is in normal position, this actuation will not affect the adjacent counter; but if the finger has been moved by one of the pins L out of the path of the dog J it cannot again assume its normal position until said dog and its corresponding actuating member F have been depressed. As a consequence the pins L may operate the fingers *f* at any point in the movement of the counters; but the carrying will not be effected until the end of the movement, and when this occurs the finger previously operated is still in position to permit the carrying. The advantage of this construction is that the counters may always be operated with perfect ease and offer very little resistance to the finger until the member E is reached, and the latter may be easily operated, as it is provided with a flat bar for the finger to rest upon.

The result of the addition may be read through a window located at any convenient point in the casing, but preferably arranged in the segmental portion D, as shown at *k*. To reset the machine for a subsequent addition, the shaft B is provided at one end with a crank-arm P, arranged outside the case, and within the case are a series of arms Q between adjacent counters, each of said arms being provided with a pawl R for engaging with one of the pins L. Thus the operator by moving the crank P through a quarter of a revolution will engage the pawls R with the pins of all the counters A and will move said counters to the zero position. The arm P is then returned to its normal position by a counterweight S.

What I claim as my invention is—

1. The combination with a plurality of reg-

ister-wheels of different denominations, having independent actuating means, of a pawl for actuating the counter of higher denomination, a member arranged to be actuated 5 during the final movement of the counter of lower denomination, a gravity-dog, and a gravity-finger having intercepting paths of movement, said dog being adapted to couple said member to said pawl normally held from 10 engagement by said finger, means operating during the movement of the counter of lower denomination for withdrawing said finger whereby said dog is permitted to effect a coupling, and cause the carrying during the 15 actuation of said member, and means whereby said finger is restored subsequent to the carrying operation.

2. In an adding-machine the combination with a counter-wheel having a notched flange 20 for actuating the same, of a carrying-pawl for actuating said flange, a lever for operating said pawl and a member for actuating said lever extending into proximity to said flange in the path of movement of the actuating means therefor. 25

3. In an adding-machine the combination with a counter-wheel having a notched flange forming the actuating means therefor, of a carrying-pawl for engaging with said flange, 30 a lever for actuating said pawl, a member for actuating said lever during the movement of said wheel when directly actuated and means for operating said lever during the movement of the counter of lower denomination.

4. In an adding-machine the combination with a series of counter-wheels of a carrying-pawl, an actuating-lever therefor, and an operating member for each of said counter-wheels, and means for coupling the operating 40 member of a wheel of lower denomination with the pawl of a wheel of higher denomination.

5. In an adding-machine a series of independently-operable counters of different denominations, a member arranged to be operated 45 during the final movement of each counter when directly actuated, a lever, and a carrying-pawl actuated by said member and said pawl engaging with the corresponding 50 counter-wheel, and means controlled by each counter for effecting a coupling between its

corresponding actuating member and the lever, and pawl corresponding to the wheel of next higher denomination.

6. In an adding-machine, the combination 55 of a plurality of counters, longitudinally-slidable members for actuating the same, of means under the control of the counters adapted to couple said slidable members to enable one member to actuate a plurality of 60 counters.

7. In an adding-machine, the combination of a plurality of counters, slidable members for actuating the same, coupling means carried by said slidable members, said coupling 65 means of each slidable member being under the control of its respective counter to couple the slidable member of said counter to the slidable member of the counter of next higher denomination to actuate the same. 70

8. In an adding-machine, the combination of a plurality of revoluble counters, a lever for each counter, a pawl carried by one end of each lever to actuate said counter, an operating member engaging the other end of each of 75 said levers and adapted to actuate the same, and connecting means between the operating members and under the control of the counters whereby one operating member is adapted to simultaneously actuate a plurality of 80 counters.

9. In an adding-machine, the combination of a frame, a shaft in said frame, a plurality of register-wheels of different orders journaled on said shaft, a slidable member for each 85 wheel, a dog pivoted to each slidable member and adapted to engage the slidable member of next higher order, pivoted levers normally holding said dogs out of connecting engagement and under the control of the wheels to 90 release said dogs to permit connecting engagement, and a lever under each wheel to actuate the same and operable by the slidable member of the lowest order when connection is made by said dogs. 95

In testimony whereof I affix my signature in presence of two witnesses.

FRANK R. WELTON.

Witnesses:

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H. C. SMITH.