

(No Model.)

4 Sheets—Sheet 1.

M. E. WINTER & C. W. CRARY.  
ADDING MACHINE.

No. 258,518.

Patented May 23, 1882.

Fig. 1.

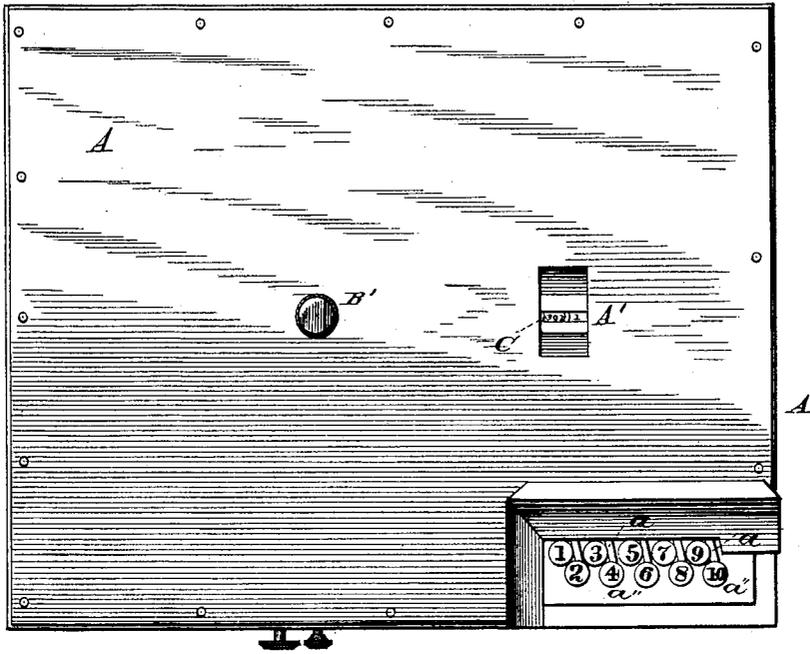
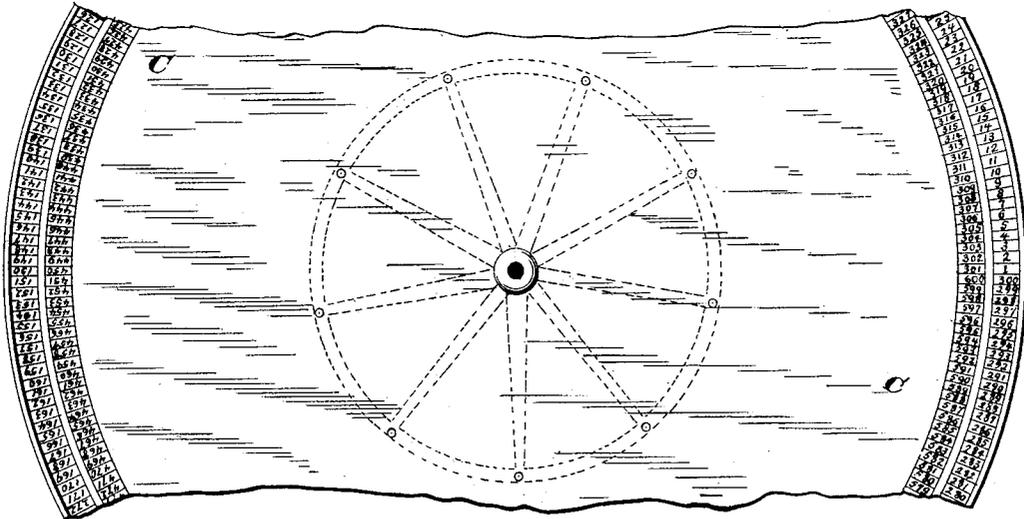


Fig. 3.



WITNESSES

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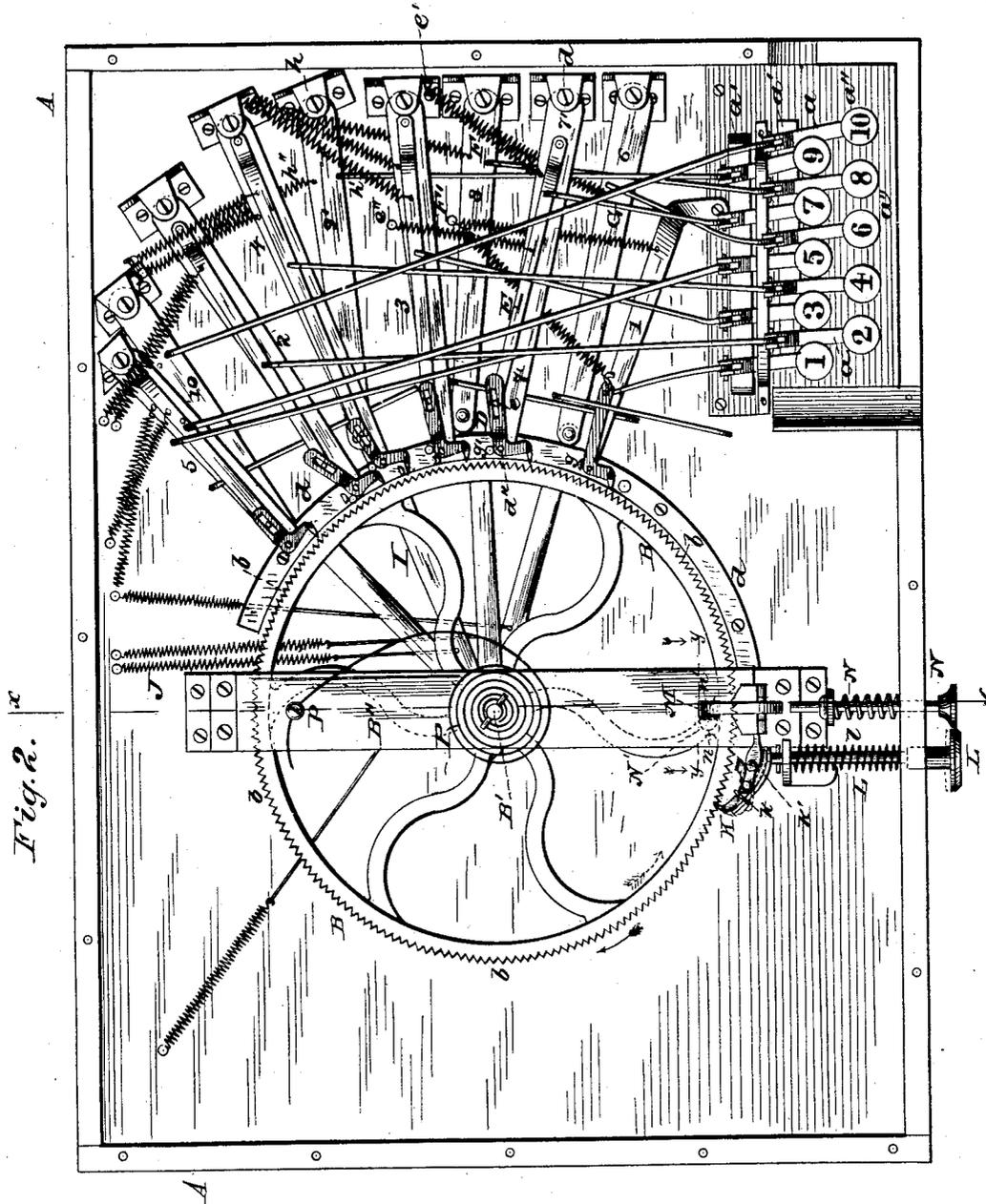


Fig. 2.

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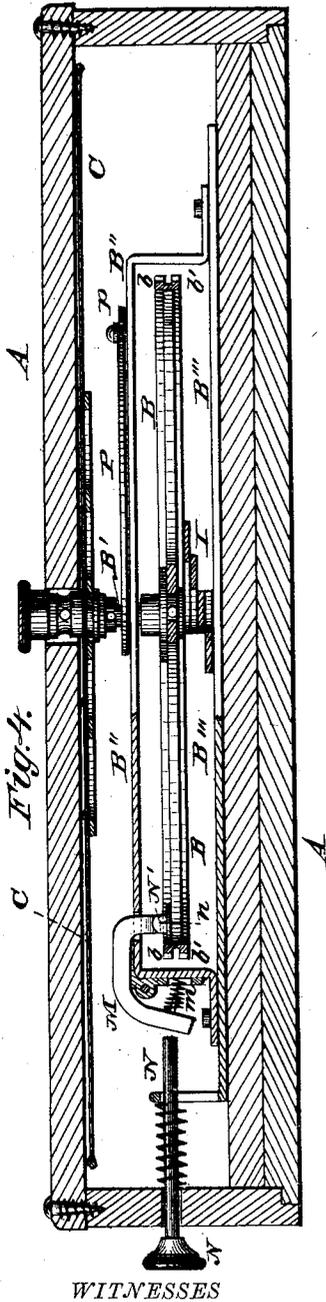
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M. E. WINTER & C. W. CRARY.

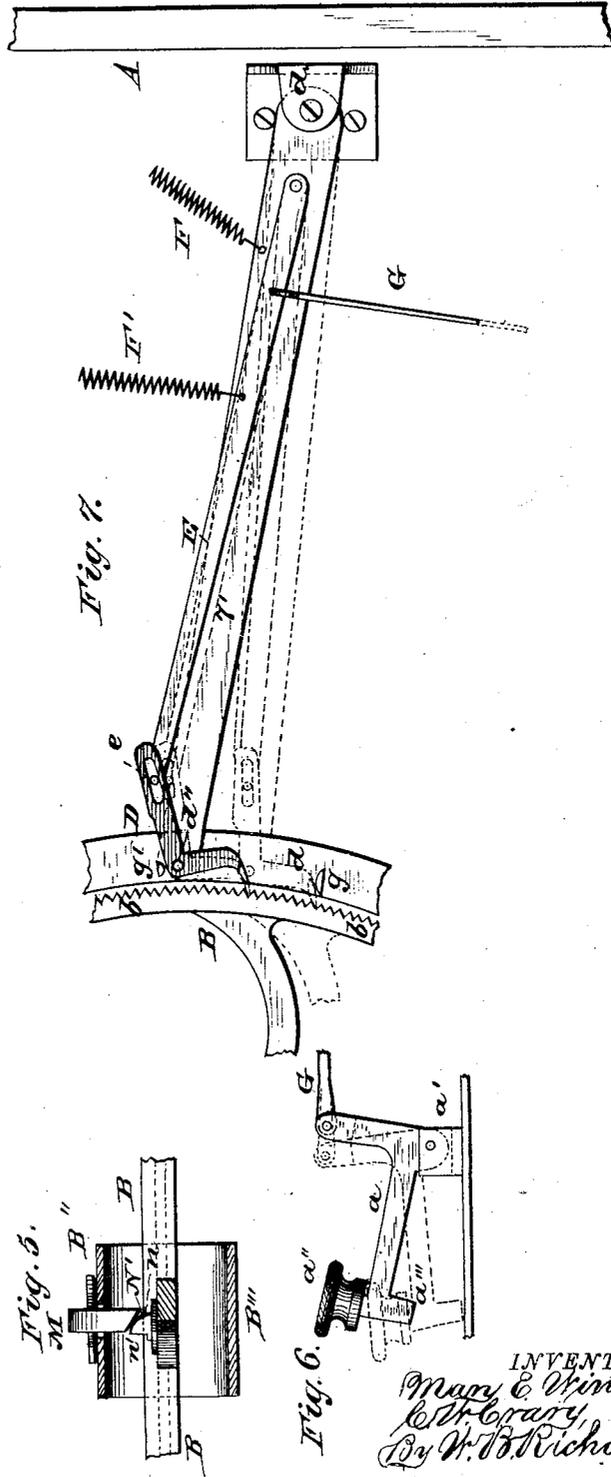
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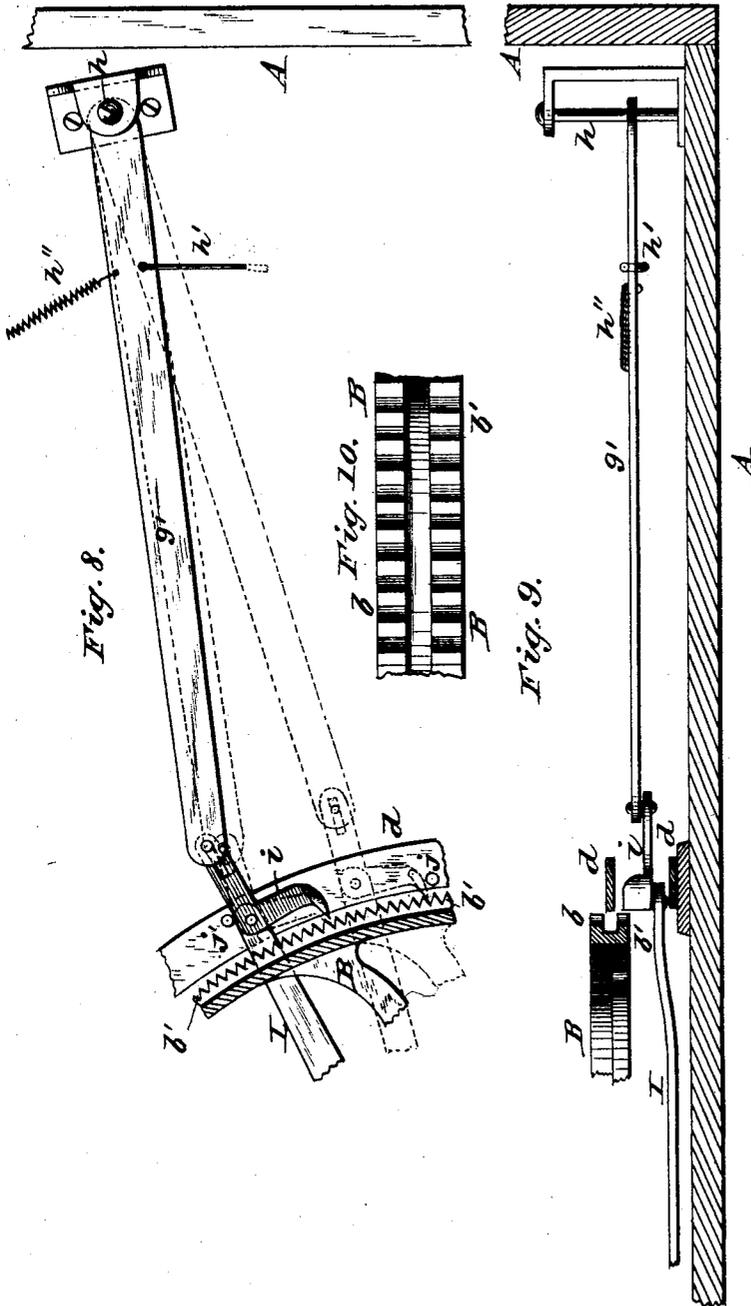
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# UNITED STATES PATENT OFFICE.

MARY E. WINTER, OF GALESBURG, AND CUSHMAN W. CRARY, OF CHICAGO,  
ILLINOIS; SAID CRARY ASSIGNOR TO SAID WINTER.

## ADDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 258,518, dated May 23, 1882.

Application filed January 25, 1882. (No model.)

To all whom it may concern:

Be it known that we, MARY E. WINTER and CUSHMAN W. CRARY, citizens of the United States, residing at Galesburg, Illinois, and Chicago, Illinois, respectively, 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.

Our invention relates to improvements in adding-machines; and it consists in constructions and combinations hereinafter described, and set forth in the claims hereto annexed.

In the accompanying drawings, which illustrate our invention, and in which the same reference-letter indicates the same part in the different figures, Figure 1 is a top plan of our machine. Fig. 2 is a top plan in which the upper part of the case and the dial-plate are removed to show the working parts below them. Fig. 3 is a top plan of the dial-plate. Fig. 4 is a sectional elevation in the line  $xx$  in Fig. 2. Fig. 5 is a sectional elevation in the line  $yy$  in Fig. 2. Fig. 6 is a side elevation of one of the operating-keys. Fig. 7 is an enlarged top plan of a segment of the ratchet-wheel and one of the arms and pawls which act upon the upper circle of ratchet-teeth thereon. Fig. 8 is an enlarged top plan of a segment of the ratchet-wheel and one of the arms and pawls which act upon its lower circle of ratchet-teeth. Fig. 9 is a side elevation of the parts shown at Fig. 8. Fig. 10 is a side elevation of a segment of the ratchet-wheel.

Referring to the drawings by letters, letter A represents a case in which the working parts are located, except the keys 1 to 10, the ends of which are exterior to the case A, so that they may be struck or pressed downward by the finger of the operator.

B is a ratchet-wheel with an upper series of ratchet-teeth,  $b$ , and a lower series,  $b'$ , in its periphery, and provided with a central shaft,  $B'$ , which is extended upward, as shown at Fig. 4, for purposes hereinafter described. The shaft  $B'$  is fixed to the ratchet-wheel, so as to be rotated therewith, and has bearings in an upper plate,  $B''$ , and lower plate,  $B'''$ .

C is a dial-plate fixed to the upper end of the shaft  $B'$ , so as to be rotated coincident with

the ratchet-wheel B. The dial-plate C is numbered in an annular series near its outer edge from 1 to 300, and in another series, concentric to the first series, from 301 to 600, or three hundred numbers in each series, which is the same number of ratchet-teeth in the upper set and also in the lower set in the periphery of the ratchet-wheel B. The top of the case A has a slot,  $A'$ , through which a single number in both series of figures on the dial-plate may be seen.

There are ten actuating-keys, (designated in the drawings by the reference-letter  $a$ , and numbered or marked in the machine by the figures 1 to 10, respectively.) The keys are T-shaped, as shown at Fig. 6, and are hinged or pivoted at one end of their heads to standards  $a'$ , the other ends of their heads being connected respectively with the arms and pawls which impel the ratchet-wheel, as hereinafter described. The outer ends of the keys are provided with heads  $a''$ , numbered as shown in the drawings, and are also provided with downwardly-projecting lugs  $a'''$ , which strike the bottom of the case A, if the keys are depressed too much, and thus prevent injury to other parts.

There are two sets of pawl-carrying arms for actuating the ratchet-wheel, one set adapted to act on the upper series of teeth on said wheel and the other set on the lower series of teeth. The general construction and operation of the upper series of pawl-carrying arms is shown at Fig. 7, which is a top plan of the key 7 and the arm  $7'$ , connected therewith. The arm  $7'$  is hinged at its outer end on a vertical shaft,  $d$ , and its inner end, which is near the ratchet-wheel, is supported on an arch-shaped plate,  $d'$ .

D is a bent pawl, formed, as plainly shown in the drawings, and hinged or pivoted at  $d''$  to the distal end of the arm  $7'$ . The rear end of the pawl D is slotted, and receives a stud,  $e$ , which projects upwardly from the free end of a pawl-tripper arm, E, which arm E is hinged or pivoted at its other end to the arm  $7'$ .

F is a spiral spring, secured at one end to the arm  $7'$  and at its other end to a stud or projection,  $e'$ , from the case A, and is adapted to retract or draw the arm  $7'$  backwardly.

F' is a spiral spring, somewhat lighter and

with less retractile force than the spring F, and is secured at one end to the arm E and at its other to a stud, *e''*, which projects from the case A, and is adapted to draw backwardly on the arm E.

G is a rod, connected at one end with the arm E and at its other end with the upper end of the head of the T-shaped key 7 in such manner that when the head *a''* of said key is depressed, as shown by dotted lines at Fig. 6, the rod G will first act upon the arm E, and drawing it forward, as shown by dotted lines at Fig. 7, will bring the pawl D into contact with a tooth in the upper series of ratchet-teeth in the wheel B, when the rod G will then act on the arm 7', and drawing it forward will thus give an impulse or forward movement to the ratchet-wheel B and dial-plate C in the direction of the full-line arrow at Fig. 2. A stop, *g*, limits the forward movement of the pawl D and arm 7', and a stop, *g'*, limits their rearward movement, and the distance between these stops is made such that each throw of the arm 7' forward will move the ratchet-tooth engaged

the distance of seven teeth, the number corresponding to the number 7 on the head *a''*, and thus move the dial-plate so as to bring a number beneath the slot in the case A, which is seven greater than the number last exposed. The keys 1, 2, 3, 4, and 5 are connected with their respective pawl-carrying arms substantially the same as herein described with reference to the key 7 and its pawl-carrying arm 7', and the pawls, the pawl-tripper arms, the springs, and the stops in connection with the keys 1, 2, 3, 4, and 5 are designated by the same letters as designate the corresponding parts in connection with the key 7. The stops *g* and *g'*, in connection with the different keys named, are arranged at different distances apart, so that the depression of the key 1 will move the dial-plate one number, the depression of key 2 will move it two numbers, the depression of key 3 will move it three numbers, and 4 and 5 will move it four and five numbers, respectively; or in other words, the movement of each key will rotate the dial-plate so as to bring a number beneath the opening equal to the number last exposed, plus the number on the key operated. The pawls connected with the keys 1, 2, 3, 4, 5, and 7, all operate on the upper series of ratchet-teeth of the ratchet-wheel B, and are drawn into contact with the ratchet-teeth by the action of their respective tripper-arms E, as hereinbefore described. After the pawl acts upon the ratchet-wheel and the key is released from pressure by the operator, the spring F' will first retract the arm E, and thereby draw the pawl D out of engagement with the ratchet-teeth, and the spring F will then draw the arm to which it is connected rearwardly, and thus draw the pawl-carrying arm and the pawl back to their normal positions, as shown by full lines in the drawings, and thus prevent the pawl dragging over and wearing the ratchet-teeth, and also

more certainly insuring its engagement with the proper ratchet-tooth.

The operation of the keys 6, 8, 9, and 10 on the lower series of teeth on the ratchet-wheel, are substantially shown by the top plan of the key 9 at Fig. 8 of the drawings, where 9' represents an arm, hinged or pivoted at one end to a vertical shaft, *h*, and connected by a rod, *h'*, with the key 9, so that when the key is depressed the rod *h'* will draw the arm 9' forward. A spring, *h''*, will retract the arm 9' when the key 9 is released from pressure.

I is an arm, which is hinged or pivoted beneath the central part of the ratchet-wheel B, and, extending outwardly to near the periphery of said wheel, has a bent pawl, *i*, pivoted at its bend to its outer end. One end of the pawl *i* is slotted, and receives a stud-pin carried on the distal end of the arm 9', and the other end is adapted to engage with the ratchet-teeth in the lower series on the wheel B.

J is a spring adapted to draw back or retract the arm I. The throw of the arms I 9' are limited by stops *j j'*. When the key 9 is depressed the arm 9' will first be drawn forward, and acting on the pawl *i* will draw it into engagement with a ratchet-tooth on the wheel B, and then will draw both the arms 9' and I forward and move the ratchet-wheel and dial-plate so as to bring a number on the dial-plate beneath the opening in the case equal to the last number shown, plus the number 9, or same number as marked on the key. When the key is released the spring will retract the arm 9', so as to release the pawl *i* from the ratchet-tooth and prevent it sliding over said teeth as the arms 9' I are drawn back by their respective springs to their normal position. The keys 6, 8, and 10 are connected with the arms and pawls for operating the ratchet-wheel substantially same as the key 9, and the arms, springs, connecting-rods, and pawls, are lettered same as the corresponding parts are respectively marked by reference-letters in Fig. 8, and in connection with the key 9. The stops are arranged in connection with the keys 6, 8, and 10 so that the movement of each key moves the dial-plate to bring a number beneath the opening in the case, an amount greater than the last number exposed equal to the number on the respective key moved.

K is a detent-pawl, held into engagement with the ratchet-wheel B by a spring, *k*, and has a projecting arm, *k'*.

L is a lifter the outer end of which extends outward through the case A, and has a thumb-plate or head, *L'*, on its outer end, and the inner end of which rests against the arm *k'*, so that by pressing the rod L inwardly it will act on the rod *k'* and disengage the detent K from the ratchet-wheel, as shown by dotted lines at Fig. 2. A spring, *l*, retracts or forces the rod L outward when the pressure is removed from said rod L. The detent K serves to prevent the momentum of the ratchet-wheel carrying it too far, and more particularly to prevent any

backward movement of said ratchet-wheel arising from the backward movement of the actuating-pawls while in contact therewith.

M is a detent, bent as shown at Fig. 4, and hinged at its bent portion to the plate B''.

One end of the detent M extends down through a slot in the plate B'' to a short distance from the arms of the wheel B, and is beveled off on one side at its lower end, as shown at Fig. 5.

A spring, *m*, forces the outer end of the detent M outward and its inner end down to near the arms of the wheel B.

N is a sliding rod, with its outer end exterior to the case A and its inner end in close proximity to the outer end of the detent M, so that it may be pressed inwardly against the outer end of the detent, and thereby raise its inner end above a stop or lug, N', which projects upwardly from one arm of the wheel B.

One side, *n*, of the stop N' is sloping, and will come in contact with the sloping side of the detent M when the wheel B is rotated in the direction shown by the full-line arrow, and thereby raise the detent M, and permit the wheel to rotate in said direction. The other side, *n'*, of the stop N' is vertical, and, coming in contact with the vertical side of the detent M, when the wheel B is rotated in the direction shown by the dotted-line arrow, will arrest the rotary motion of said wheel with the number 300 on the dial-plate exposed at the opening A' in the case A.

P is a spring coiled round the shaft B', to which shaft one end of the spring is secured, its other end being secured to a standard, *p*, on the plate B''. The spring P is coiled so that the coil will be tightened as the wheel B is rotated in the direction shown by the full-line arrow, and will rotate the wheel B in the reverse direction when the detent K is disengaged with said wheel.

As illustrating the operation further than already herein described, suppose the number 300 to be exposed at the slot A', and the number 5 to be the first number in a column to be added; by striking the key 5 the dial will be rotated to bring the figure 5 thereon exposed at the opening A'. Then suppose the number 6 to be the next number in the column to be added; by striking the key 6 the dial will be moved to expose the number 11 at the opening A', which number 11 represents the sum of 6 added to 5; and thus the addition may be continued on the outer series of figures on the dial until the number 300 is reached, when the addition may be continued on the inner series until the number 600 is reached. Whenever a column of numbers are added, and it is desired to commence a new column, the detent-pawl K may be disengaged from the ratchet-wheel by pressing on the lifter L, and the spring P be allowed to rotate the ratchet-wheel in the direction shown by the dotted-line arrow until the stop N' comes in contact with the detent M and arrests the rotation, with the dial-plate in the position hereinbefore described, and in posi-

tion to commence adding a new column of numbers.

It will be seen that an index or pointer, instead of a dial-plate, may be arranged to rotate with the ratchet-wheel, and a fixed dial-plate be used therewith, and also that a brake may be attached to the detent-pawl K, as shown by dotted lines at the rear end of the pawl K, which brake will come in contact with the ratchet-wheel when the pawl is turned to release it, and thus prevent a too rapid motion of the ratchet-wheel from the action of the spring P.

What we claim as new is—

1. In an adding-machine, in combination with a ratchet-wheel, operating-keys, and pawl-carrying arms, the bent pawls hinged to their carrying-arms, and pawl-trippers hinged or pivoted to said carrying-arms and adapted to swing the pawls to release them from the ratchet-wheel, substantially as and for the purpose specified.

2. In an adding-machine, in combination with a ratchet-wheel, swinging pawl-carrying arms, and pawls hinged thereto, pawl-trippers, also hinged to said pawl-carrying arms, and adapted to swing the parts into and out of gear with the ratchet-wheel, substantially as and for the purpose specified.

3. In an adding-machine, in combination with a ratchet-wheel, swinging pawl-carrying arms, and slotted pawls hinged to said arms, pawl-trippers, also hinged to said arms, and adapted to swing the pawls, substantially as and for the purpose specified.

4. In an adding-machine, in combination with the ratchet-wheel, swinging pawl-carrying arms, swinging pawls, and pawl-tripping arms, springs connected, the one with the pawl-carrying arm and the other with the pawl-tripper arm, substantially as and for the purpose specified.

5. In an adding-machine, in combination with the ratchet-wheel, swinging pawl-carrying arms, swinging pawls, pawl-tripping arms, and springs adapted to move both the pawl-carrying arms and the pawl-tripper arms, rods connected with the pawl-tripper arms and the operating-keys, whereby the tripper-arm is moved to engage the pawl with the ratchet-wheel before the pawl-carrying arm is moved, substantially as and for the purpose specified.

6. In an adding-machine, in combination with the ratchet-wheel and pawl-carrying arms with hinged pawls, an arc-shaped support for the distal end of the pawl-carrying arms, substantially as and for the purpose specified.

7. In an adding-machine, in combination with a ratchet-wheel and pawl-carrying arms, hinged at their outer ends or ends exterior to the ratchet-wheel, actuated by keys and connecting-rods, stops adapted to limit the throw of the pawls, substantially as and for the purpose specified.

8. In an adding-machine, in combination with a ratchet-wheel and swinging arms hav-

ing pawls hinged to their distal ends, stops adapted to arrest the movement of the pawl-carrying arms by coming in contact with said pawls, and thereby control the extent of movement of the ratchet-wheel, substantially as and for the purpose specified.

9. In an adding-machine, in combination with a ratchet-wheel, arms I, having pawls hinged to their outer ends, and swinging arms adapted to swing said pawls, rods connecting the swinging arms with operating-keys, substantially as and for the purpose specified.

10. The arm 9' and I, in combination with retracting-springs, actuating rods and keys, ratchet-wheel, and hinged pawls, substantially as and for the purpose specified.

11. In combination with the ratchet-wheel, arms I and 9', and hinged pawl, the stops for regulating the throw of the swinging arms, substantially as and for the purpose specified.

12. In combination with the ratchet-wheel and detent M, having its end beveled on one side, the stop N', having an inclined side and a vertical side, adapted to permit the ratchet-wheel to rotate in one direction and to arrest its motion where desired when rotated in an

opposite direction, substantially as and for the purpose specified.

13. In an adding-machine, in combination with a dial-plate, and ratchet-wheel which rotates coincidentally therewith, and with swinging arms having pawls hinged to their distal ends, rods connecting said swinging arms with actuating-keys, substantially as and for the purpose specified.

14. In combination with the ratchet-wheel and arms hinged at their outer ends and provided with pawls hinged to their ends next to the ratchet-wheel, actuated by keys and connecting-rods, stops adapted to limit the throw of the pawls, substantially as and for the purpose specified.

In testimony whereof we affix our signatures in presence of two witnesses.

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CUSHMAN W. CRARY.

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ALICE WINTER,

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