

No. 816,342.

PATENTED MAR. 27, 1906.

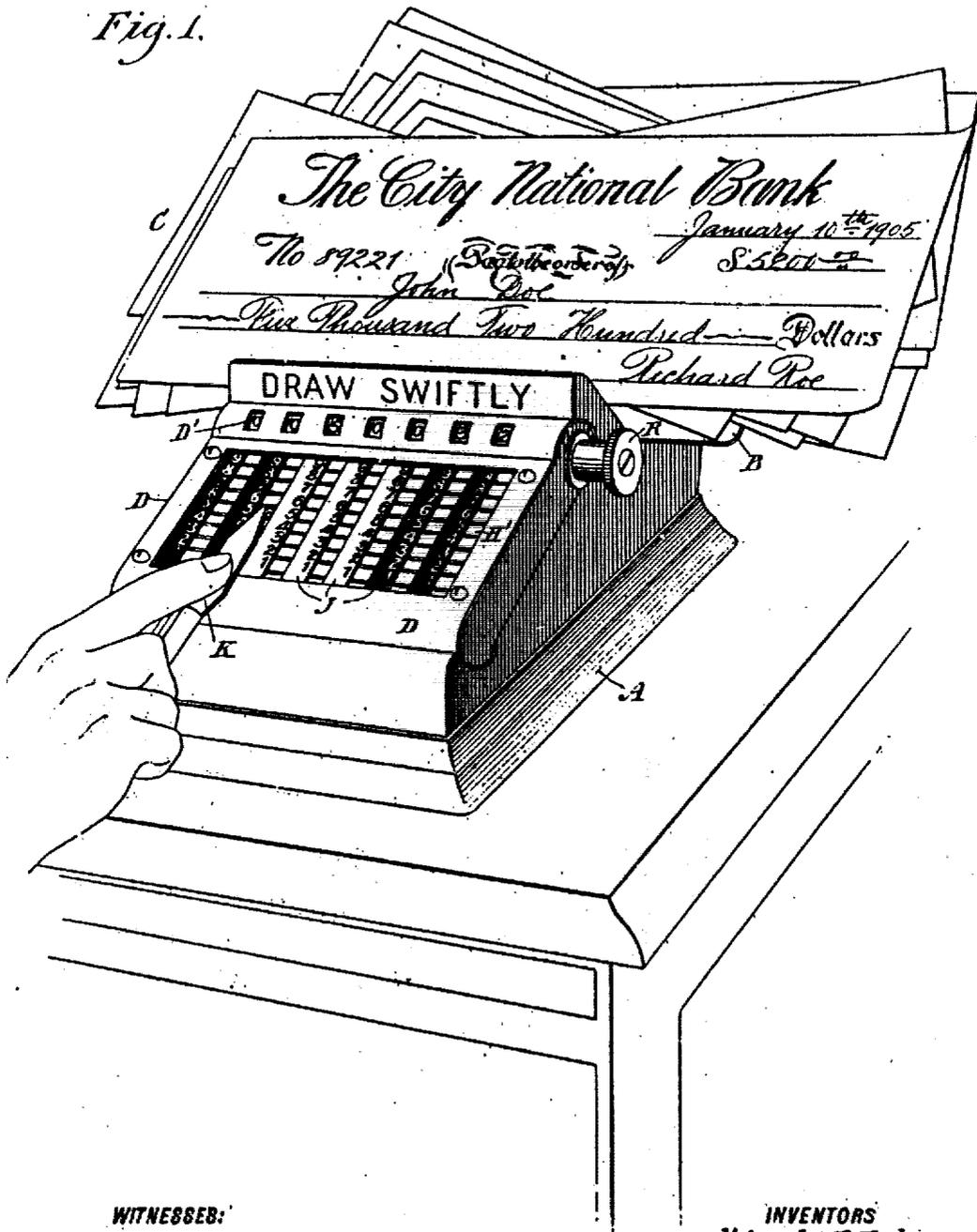
N. H. KODAMA & A. I. GANCHER.

ADDING MACHINE.

APPLICATION FILED JAN. 19, 1906.

3 SHEETS—SHEET 1.

Fig. 1.



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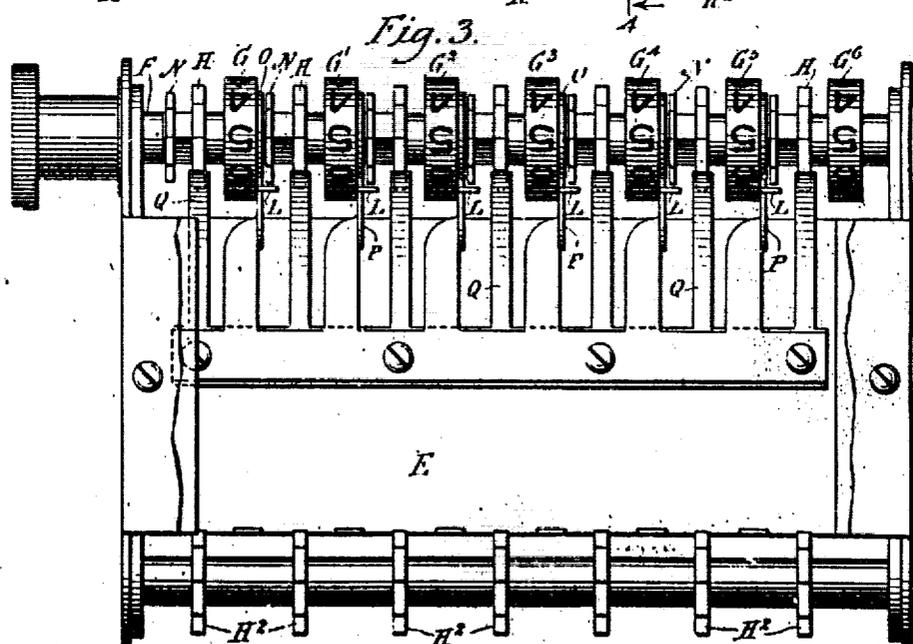
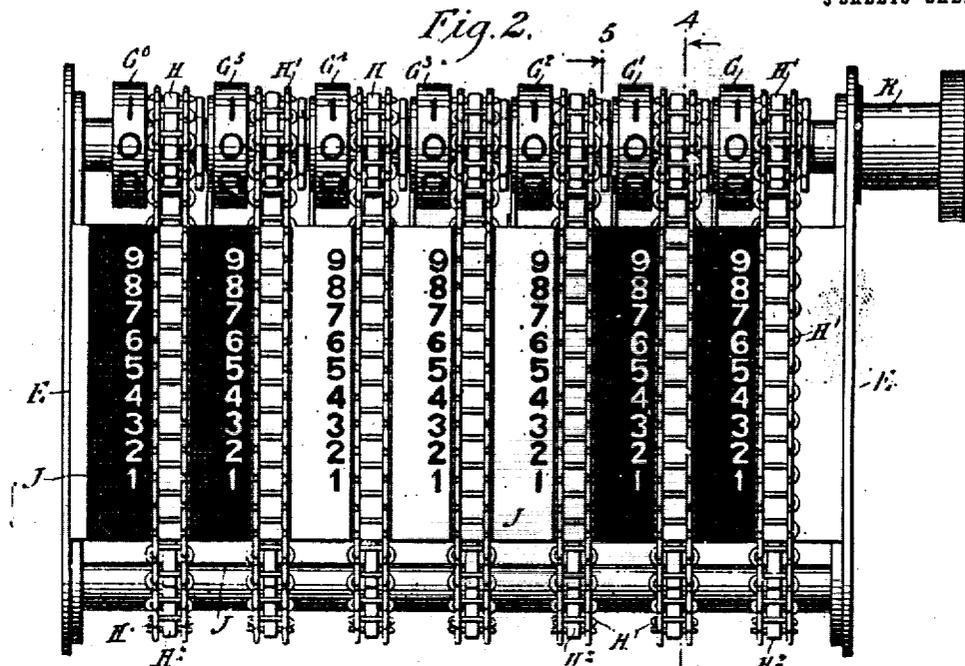
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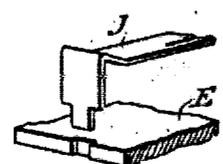
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3 SHEETS—SHEET 2.



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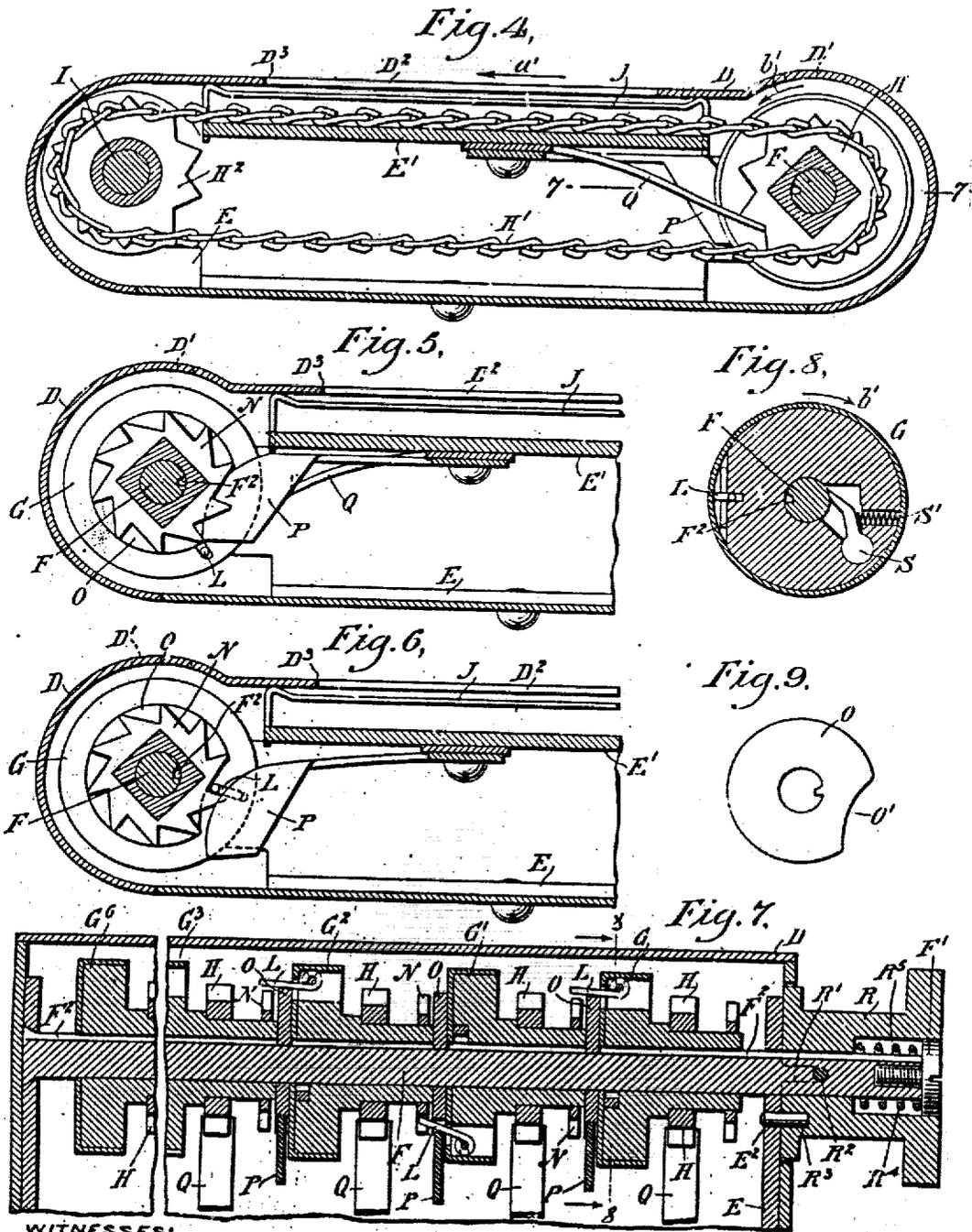


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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

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## ADDING-MACHINE.

No. 816,342.

Specification of Letters Patent.

Patented March 27, 1906.

Application filed January 19, 1905. Serial No. 241,763.

*To all whom it may concern:*

Be it known that we, NOBYOSHI H. KODAMA, a subject of the Mikado of Japan, and ABRAHAM I. GANCHER, a citizen of the United States, both residents of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Adding-Machine, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved adding-machine which is comparatively simple and durable in construction, not liable to easily get out of order, and arranged to permit convenient manipulating with a view to add up any desired number of sums and indicate the total, and more particularly to add sums representing money in dollars and cents or other denominations.

The invention consists of novel features and parts and combinations of the same, as will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a perspective view of the improvement. Fig. 2 is an enlarged face view of the improvement detached from the stand and its casing removed. Fig. 3 is a rear face view of the same, the operating-chains being removed. Fig. 4 is an enlarged cross-section of the improvement on the line 4 4 of Fig. 2. Fig. 5 is a like view of the same on the line 5 5 of Fig. 2. Fig. 6 is a similar view of the same, showing the parts in a different position. Fig. 7 is an enlarged longitudinal sectional elevation of the same on the line 7 7 of Fig. 4. Fig. 8 is a cross-section of the same on the line 8 8 of Fig. 7. Fig. 9 is a face view of one of the disk cams, and Fig. 10 is a perspective view of one of the numeral-plates.

The adding-machine, as shown in Fig. 1, is removably mounted on a stand A, provided at its rear end with a rack B for supporting the bills, checks, or other documents C, from which the amounts to be added are read, the documents being displayed to allow the operator to conveniently read the amounts successively. The adding-machine is provided with a casing D, fitting an inclined recess in

the front of the stand A, and in the said casing is fitted a frame E, in which is journaled a spindle F, on which are mounted to turn loosely number-wheels G, G', G<sup>2</sup>, G<sup>3</sup>, G<sup>4</sup>, G<sup>5</sup>, and G<sup>6</sup>, each having on its peripheral face the numerals from "0" to "9," the number-wheel G representing unit cents; the number-wheel G' tens of cents, and the number-wheels G<sup>2</sup>, G<sup>3</sup>, G<sup>4</sup>, G<sup>5</sup>, and G<sup>6</sup> representing unit dollars, tens of dollars, hundreds of dollars, and thousands and tens of thousands of dollars. It is, however, expressly understood that the wheels may represent other denominations of money besides dollars and cents as mentioned. The numeral which is on the top of a wheel at the time is visible through a corresponding aperture D' in the casing D to allow the operator to read the aggregate amount of the sums added, as hereinafter more fully described.

In order to turn each number-wheel manually and independently of the others, the following device is provided. On the hub of each number-wheel G, G', G<sup>2</sup>, G<sup>3</sup>, G<sup>4</sup>, G<sup>5</sup>, and G<sup>6</sup> is secured a sprocket-wheel H, over which passes a sprocket-chain H', also passing over an idle sprocket-wheel H<sup>2</sup>, mounted to turn loosely on a shaft I, fixed in the frame E. The top run of each chain H' travels over a table E', forming part of the frame E, and the upper run of each chain extends in a guideway formed by numeral-plates J, secured to or forming part of the table E' or its supporting-frame E. The upper surfaces of the numeral-plates are provided with the numerals "0" to "9" in transverse alinement with an opening D<sup>2</sup>, the distance between adjacent numerals corresponding to the length of a link of the chain H'. The numeral-plates J and portions of the upper runs of the chains H' appear through openings D<sup>2</sup> in the top of the casing D to allow the operator to see the numerals on the plates and to engage the link of the chain H' by the use of a suitable tool K in the hand of the operator to pull the chain along in the direction of the arrow a' (see Fig. 4) until the tool abuts against the lower edge D<sup>2</sup> of the opening D<sup>2</sup>, the said lower edge D<sup>2</sup> thus forming a stop for the tool. Thus when a chain is pulled by the use of the tool the corresponding number-wheel is turned a distance corresponding to the travel of the chain. Now, if, for instance, it is desired to add "4" at any one of the devices, it is only necessary

for the operator to engage the tool with the corresponding chain at the link in register with the numeral "4" of the adjacent numeral-plate J and to then pull on the chain in the direction of the arrow  $a'$  until the tool abuts against the lower edge  $D^3$  of the opening  $D^1$ , the tool then being disengaged from the chain-link. If it is desired to add "9" at any of the devices, the tool is engaged with the corresponding chain at the link registering with the numeral "9" of the numeral-plate J, and then the chain is pulled downward until the tool abuts against the lower edge  $D^3$  of the opening  $D^1$ . The number-wheels turn in the direction of the arrow  $b'$ .

The numeral-plates J for the units and tens of cents are preferably in contrast to the adjacent numeral-plates J for the units, tens, and hundreds of dollars, and the thousands and tens-of-thousands numeral-plates J are likewise in contrast to the said units, tens, and hundreds of dollars numeral-plates, to enable the operator to readily distinguish the several numeral-plates with a view to facilitating the use of the machine.

In order to turn a number-wheel from a preceding one whenever the latter moves from "9" to "0," the following device is provided: In each number-wheel G, G', G<sup>2</sup>, G<sup>3</sup>, G<sup>4</sup>, and G<sup>5</sup> is fulcrumed a sidewise-extending pawl L, adapted to engage a ratchet-wheel N, secured on the hub of the next following number-wheel, and the said pawl L rides on the peripheral face of a disk cam O, secured to the spindle F, normally locked against rotation on the frame E, as hereinafter more fully described. Each disk cam O is arranged to normally hold the corresponding pawl L out of engagement with the next following ratchet-wheel N, and each disk cam O is provided with a cut-out portion O' to allow the pawl L to move into engagement with a tooth of the ratchet-wheel N with a view to turn the latter to rotate the following number-wheel a sufficient distance to bring the next following numeral into view at the opening D'. In order to cause the pawl L to travel inwardly on the cut-out portion O', a cam-arm P is provided, (see Figs. 5 and 6,) registering with the cut-out portion O', and consequently causing the pawl L to follow the cut-out portion O', and thereby engage a tooth of the ratchet-wheel N with a view to turn the same and its number-wheel, it being understood that the corresponding sprocket-wheel H and chain H' move with the number-wheel. When the number-wheel G, for instance, turns from "9" to "0," then the pawl L of this number-wheel G engages the ratchet-wheel N, secured on the hub of the number-wheel G', and thus turns the number-wheel G' the distance between two successive numerals to bring the next following numeral in view at the opening D'. In

other words, when the number-wheel G has completed a revolution and registered nine cents it turns the next number-wheel G' to the following numeral to indicate a corresponding ten. In a like manner the number-wheel G' turns the number-wheel G<sup>2</sup>, and the latter the number-wheel G<sup>3</sup>, and so on throughout the series whenever a number-wheel moves from "9" to "0" position.

In order to prevent the number-wheels and the parts attached thereto from turning in a reverse direction or accidentally beyond the distance they should travel, spring-dogs Q are provided, engaging at the time a tooth of the corresponding sprocket-wheel H, as plainly indicated in Fig. 4. As indicated in the drawings, the cam-arms P are formed from a single plate, and in a like manner the dogs Q are integral parts of the plate, and the said plates are fastened by the same means, such as screws, to the under side of the table E', the plates being superimposed, as plainly indicated in Figs. 4, 5, and 6. By having the plates with the spring cam-arms the construction is very much simplified, and as the arms can yield any slight inaccuracies in the construction of the adjacent parts or inaccuracies caused by wear of the parts do not affect the proper working of the machine, it being understood that the spring cam-arms P yield sufficiently to compensate for any existing inaccuracies.

In order to permit of conveniently resetting the several number-wheels to "0" before starting on the operation, the following device is provided: One end of the spindle F projects beyond the frame E and casing D, and on this end of the spindle is arranged a knob R, adapted to turn with and to slide longitudinally on the said spindle F. The knob R is provided with an elongated slot R', (see Fig. 7,) engaged by a pin R<sup>2</sup>, fastened to the spindle F, so that when the knob R is turned the spindle F turns with it. Normally, however, the knob R is held against turning, and for this purpose the inner end of the knob is provided with a pin R<sup>3</sup>, adapted to engage an aperture E<sup>3</sup> in one side of the frame E. In order to disengage the pin R<sup>3</sup> from the aperture E<sup>3</sup>, it is necessary for the operator to exert an outward pull on the knob R. Normally the knob R is held in locking position by a spring R<sup>4</sup>, held in a central recess R<sup>5</sup>, arranged in the outer end of the knob, the said spring abutting against the inside of a head F', secured to or forming part of the spindle F. Each of the number-wheels G, G', G<sup>2</sup>, G<sup>3</sup>, G<sup>4</sup>, G<sup>5</sup>, and G<sup>6</sup> is provided with a pawl S, (see Fig. 8,) extending in a reverse direction to the normal turning of the number-wheel, the said pawl being pressed on by a spring S' to hold the free end of the pawl in peripheral engagement with the spindle F. The latter is provided with a longitu-

dinally-extending recess or keyway  $F^2$ , adapted to be engaged by the free end of the pawl  $S$  when the spindle  $F$  is turned in a forward direction, so that the spindle  $F$  causes the several number-wheels  $G, G', G^2, G^3, G^4, G^5,$  and  $G^6$  to turn whenever their pawls  $S$  drop into engagement with the recess  $F^2$ . The several pawls  $S$  are so arranged in their number-wheels that when they move in register with the recess  $F^2$  the numerals of the several number-wheels stand in alinement with each other. When it is desired to reset the machine, it is only necessary for the operator to pull the knob  $R$  outward to unlock the knob by disengaging the pin  $R^3$  from the aperture  $E^2$ , and then the operator turns the knob, and consequently the spindle  $F$ , in the direction of the arrow  $b'$ —that is, in the direction in which the number-wheels turn when the machine is used for adding sums. This rotation of the spindle  $F$  causes engagement of the several pawls  $S$ , so that the number-wheels  $G, G', G^2, G^3, G^4, G^5,$  and  $G^6$  are finally all brought in to such a position that their numerals stand in alinement, and consequently the operator on further turning of the knob  $R$  and spindle  $F$  can finally bring the "0" of the several number-wheels to appear in the openings  $D'$ .

The operation is as follows: Presuming that the aggregate amount of several sums already added by the use of the machine is "\$300.32" and the next sum to be added to "\$5,200," the amount of the check shown in Fig. 1, the operator by the use of the tool  $K$  engages the chain  $H'$  for the number-wheel  $G^4$  (hundreds of dollars) opposite the numeral "2" on the numeral-plate  $J$  and then pulls this chain downward until the pawl  $K$  abuts against the edge  $D^3$  of the opening  $D^2$ . The tool is then disengaged from the chain. The travel of the chain causes the rotation of the number-wheel  $G^4$  to the extent of two numbers, so that the numeral "5" of this number-wheel now appears in its opening  $D^2$ . The operator now engages the tool with the chain  $H$  for the number-wheel  $G^5$  opposite the numeral "5," (see Fig. 1) as the check calls for five thousands of dollars, and then the operator pulls this chain downward until the tool abuts against the edge  $D^3$ , and this movement of the chain causes the wheel  $G^5$  to turn from "0" position until the numeral "5" appears in the corresponding opening  $D'$ . The total amount now indicated at the openings  $D'$  appears as "\$5,500.32"—that is, the aggregate amount of the original sum of "\$300.32" and that of the check "\$5,200." If the next following check is for, say, eighty-four cents, the operator engages the tool with the chain  $H'$  for the number-wheel  $G$  opposite the numeral "4" of the numeral-plate  $J$  and then pulls the chain downward, as previously described, so that the wheel  $G$  is turned until the numeral "6" appears in the open-

ing  $D'$ . The operator now engages the tool with the chain for the number-wheel  $G'$  opposite the numeral "8" of the corresponding numeral-plate and then pulls the chain downward. The number-wheel  $G'$  is turned the distance of eight numbers, and in doing so the wheel stops with the numeral "1" displayed in the opening  $D'$ , and as the wheel was turned from "9" to "0" it is evident that its pawl  $L$  engaged the ratchet-wheel  $X$  of the next following number-wheel  $G^2$ , so that the latter was turned to the following number—that is, to the number "1"—which now appears in the opening  $D'$ , and the total amount now registered is "\$5,501.16." When it is desired to reset the machine so that "0" of the several wheels  $G, G', G^2, G^3, G^4, G^5,$  and  $G^6$  appears in the openings  $D'$ , it is only necessary for the operator to pull the knob  $R$  outward to unlock it and then turn it in the direction of the arrow  $b'$ , so that the spindle  $F$  finally engages the several pawls  $S$  to turn the number-wheels in the reverse direction until the "0" of the several wheels appears in the openings  $D'$ . When this has been done, the operator releases the knob  $R$ , so that the spring  $R^4$  pushes the knob back to its original position—that is, engages the pin  $R^3$  with the opening  $E^2$  to hold the knob, and consequently the spindle  $F$ , against turning until the machine is again reset, as above described.

Instead of working the machine from the right to the left, as described—that is, starting with the unit cents—it may be actuated from the left to the right, the final total appearing through the openings  $D'$  in either case. By placing the casing  $D$ , containing the works of the adding-machine, in an inclined position in the frame the operator can conveniently apply the tool to the corresponding chain to pull the same downward, the tool preferably consisting of a handled shank having an angular terminal or hook for engagement of a link of a chain.

In practice it has been found convenient to form recesses in the number-wheels for the reception of the pawls  $L$  and  $S$  and springs  $S'$  and to cover the said recesses and hold the same in place by a suitable cap, as plainly indicated in Fig. 7, the cap, however, forming a part of the wheel and bearing the numerals or digits on its flange.

The adding-machine may be held in the hand and worked instead of being placed on the stand, and as the machine is very compact it does not take up much space, can be conveniently carried in a pocket, and used at any time. By having the resetting device constructed in the manner described it takes the operator but a few moments to set the number-wheels to "0" to permit almost instant use of the machine for adding up another column of figures.

and its working parts comparatively few and not liable to easily get out of order; long life of the machine is insured.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. An adding-machine comprising a series of number-wheels, manually-controlled means for turning the said number-wheels, independent one of the other, a ratchet-wheel for each number-wheel, sidewise-projecting pawls, one for each number-wheel and adapted to engage the ratchet-wheel of the next following number-wheel in the series, fixed disk cams, one for each pawl, concentric with the number-wheels, each disk cam normally holding the corresponding pawl out of engagement with the ratchet-wheel of the next following number-wheel, the disk cam having a cut-out portion for allowing the pawl to move into engagement with the ratchet-wheel on the number-wheel carrying the pawl completing a turn, and a spring-arm fixed at one end and provided at the other end with a cam, having a curved edge corresponding to the cut-out portion of the disk cam for causing the pawl to follow the said cut-out portion.

2. An adding-machine comprising a series of number-wheels, manually-controlled means for turning the said number-wheels, independent one of the other, a ratchet-wheel for each number-wheel, sidewise-projecting pawls, one for each number-wheel and adapted to engage the ratchet-wheel of the next following number-wheel in the series, fixed disk cams, one for each pawl, concentric with the number-wheels, each disk cam normally holding the corresponding pawl out of engagement with the ratchet-wheel of the next following number-wheel, the disk cam having a cut-out portion for allowing the pawl to move into engagement with the ratchet-wheel on the number-wheel carrying the pawl completing a turn, and a fixed plate having spring-dogs for the ratchet-wheels and spring-cams having curved edges corresponding in shape to the cut-out portions of the disk cams, the said spring-cams yieldingly engaging the pawls and directing them into the cut-out portions of the disk cams.

3. An adding-machine comprising a frame having a table, and numeral-plates on the table spaced apart to form guideways, a manually-controlled spindle journaled in the said frame and normally held against turning, number-wheels mounted to rotate loosely in one direction on said spindle, sprocket-wheels each turning with a corresponding number-wheel, idler sprocket-wheels journaled in the frame, endless chains passing over the said sprocket-wheels, the top run of the chains traveling over the table and extending in the guideways formed by the numeral-plates, a ratchet-wheel turning with each

number-wheel, sidewise-projecting pawls one for each number-wheel and adapted to engage the ratchet-wheel of the next following number-wheel in the series, fixed disk cams one for each pawl, concentric with the number-wheels, each disk cam normally holding the corresponding pawl out of engagement with the ratchet-wheel of the next following number-wheel, the disk cams each having a cut-out portion for allowing the pawl to move into engagement with the ratchet-wheel on the number-wheel carrying the pawl completing a turn, a plate carrying integral spring-cams registering with the cut-out portions of the disk cams to direct the pawls into said cut-out portions, and a plate carrying integral spring-dogs engaging the sprocket-wheels turning with the number-wheels, the said plates being superimposed and secured by the same means to the under side of the table, and a spring-pressed pawl fulcrumed on each number-wheel, and extending in the reverse direction to that in which the wheel is normally turning, the said pawl being adapted to engage a recess on the spindle.

4. An adding-machine comprising a frame having a table and numeral-plates on the said table, spaced apart to form guideways, a spindle journaled in the said frame and normally held against turning, number-wheels mounted to rotate loosely in one direction on the said spindle and independent one of the other, sprocket-wheels, each secured to a corresponding number-wheel and turning therewith, an idler sprocket-wheel journaled in the frame, an endless chain passing over the said sprocket-wheels, the links of each chain corresponding each to the distance between adjacent numerals on the numeral-plates, a ratchet-wheel turning with each number-wheel a pawl pivoted in a recess in each number-wheel and extending sidewise to engage the ratchet-wheel of the next adjacent number-wheel, and means directing a pawl into and out of engagement with its ratchet-wheel, the said means consisting of disk cams held on the spindle and over the peripheral edges of which ride the said pawls, each disk cam having a cut-out portion in its periphery, spring cam-plates fixed on the frame and registering with said cut-out portions of the disk cams, the said cam-plates being adapted to yieldingly engage the pawls, to direct the same into the cut-out portions, and spring-dogs fixed on the frame and engaging the sprocket-wheels secured to the number-wheels for preventing reverse movement of said number-wheels.

5. The combination with a stand having an inclined seat curved at the top and bottom of an adding-machine having a casing shaped to correspond with the said inclined seat and removably fitting within the same.

6. The combination with a stand provided with a rack at its rear portion, and having an

inclined recess in its front portion, of an adding-machine having a casing containing the registering mechanism, the said casing removably fitting said inclined recess in the front of the stand.

7. An adding-machine comprising a frame, a spindle journaled in the frame, number-wheels mounted to rotate loosely in one direction on the said spindle, sprocket-wheels secured on the hubs of the number-wheels, a shaft fixed in the frame, sprocket-chains passing over the sprocket-wheels on the hubs of the number-wheels and over corresponding idle sprocket-wheels mounted to turn loosely on the said fixed shaft, ratchet-wheels secured on the hubs of the number-wheels, a sidewise-extending pawl fulcrumed on each number-wheel and adapted to engage the ratchet-wheel on the hub of the next adjacent number-wheel, disk cams secured on the spindle and normally holding the pawls out of engagement with said ratchet-wheels, each disk cam having a cut-out portion to allow the pawl to move into engagement with the corresponding ratchet-wheel, a plate having spring-cams registering with the cut-out portions of the disk cams for directing the pawls into the said cut-out portions, and a plate having spring-dogs engaging the sprocket-wheels on the hubs of the number-wheels for preventing reverse movement of said number-wheels, the said plates being superimposed and secured to the frame.

8. An adding-machine comprising a frame having a table, a spindle mounted in the frame adjacent to one end of the table, a series of number-wheels mounted to turn on said spindle independently of each other, a ratchet-wheel on the hub of each number-wheel, a sprocket-wheel on the hub of the number-wheel between the latter and the ratchet-wheel, a pawl carried by each number-wheel and adapted to engage the ratchet-wheel on the hub of the next number-wheel in the series, disk cams fixed to the spindle between the number-wheels and normally holding the corresponding pawls out of engagement with the ratchet-wheels, the disk cams each having a cut-out portion to permit the pawl to move into engagement with the ratchet-wheel, spring-dogs fixed to the under side of the table and engaging the sprocket-wheels on the hubs of the number-wheels, and spring-arms also fixed to the under side of the table and arranged alternately to the spring-dogs, the said spring-arms being provided at their free ends with cams registering with the cut-out portions of the disk cams, for the purpose set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

NOBYOSHI H. KODAMA.  
ABRAHAM I. GANCHER.

Witnesses:

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JNO. M. RITTER.