

W. LANG.
ADDING MACHINE.

No. 431,365.

Patented July 1, 1890.

Fig. 1.

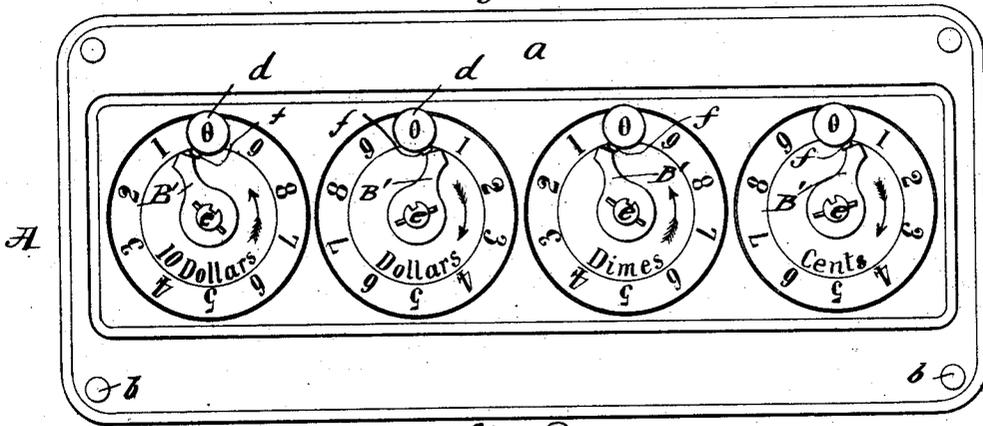


Fig. 2.

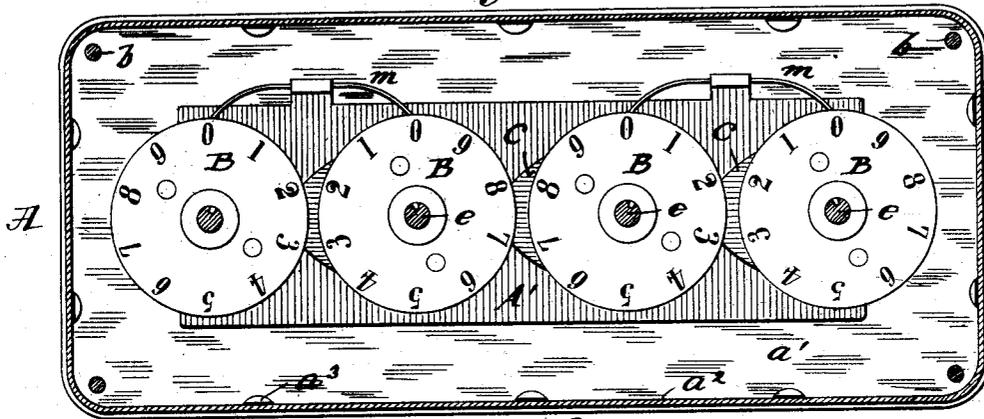
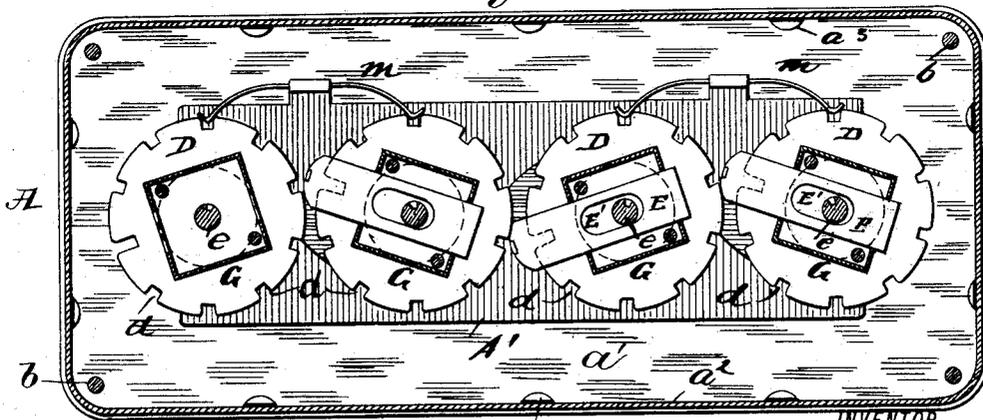


Fig. 3.



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Fig. 4.

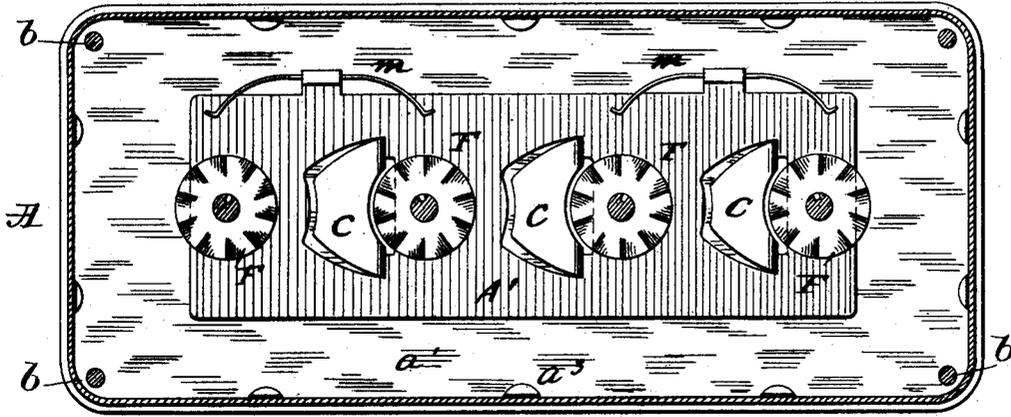


Fig. 5.

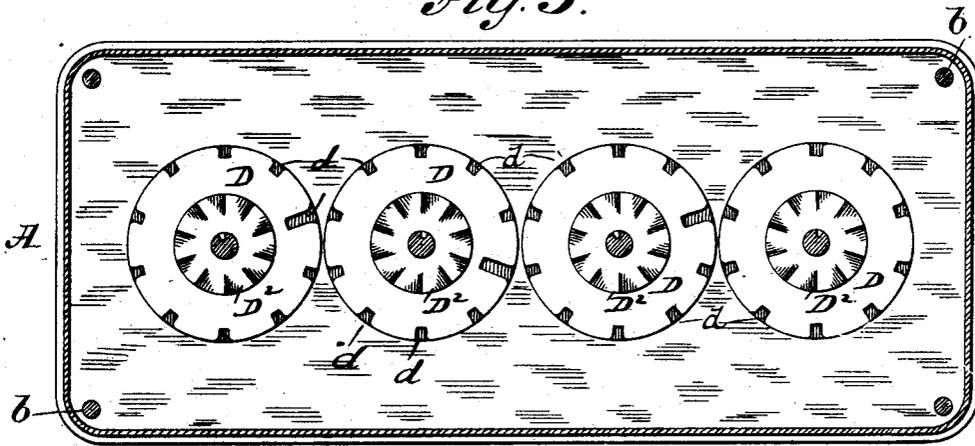
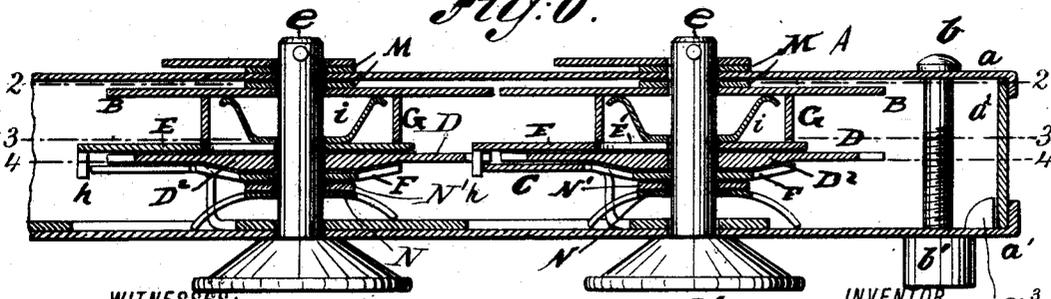


Fig. 6.



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UNITED STATES PATENT OFFICE.

WILLIAM LANG, OF BROOKLYN, NEW YORK.

ADDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 431,365, dated July 1, 1890.

Application filed September 9, 1889. Serial No. 323,391. (Model.)

To all whom it may concern:

Be it known that I, WILLIAM LANG, of Brooklyn, in the county of Kings and State of New York, a citizen of the United States, have invented certain new and useful Improvements in Adding-Machines, of which the following is a specification.

This invention relates to an improved adding-machine, by which additions of any numbers can be quickly and easily executed by mechanical means, all the members of the machine being stamped out of sheet metal and readily assembled, so that the machine can be manufactured and sold at comparatively small expense.

The invention consists of rotary disks which turn independently of each other on their axes, said disks representing units, tens, hundreds, &c., and being each provided with numerals from 0 to 9. The pivot-shafts of the disks are extended beyond the casing containing the disk and provided at the bottom of the casing with buttons or handles for conveniently turning them. The front ends of the pivot-shafts are extended beyond the front part of the casing and provided with index-points, which move along dials that correspond to the disks, and are provided with numerals and with openings at the zero-point, through which the numerals of the rotary disks are visible. In a box at the under side of each disk is guided a slotted slide-piece, which carries at the outer end a tooth that moves along a fixed cam that extends from one disk to the circumference of the other, said cam serving to give motion to the slide-piece, so that its tooth engages a recess on the second disk arranged below the rotary disks, said disk having as many recesses in the circumference as there are numerals on each disk. A spring check-pawl engages the recesses of the disks, so as to prevent their being turned for more than the distance between two recesses. A pawl-and-ratchet device is provided below each recessed disk for turning the same.

In the accompanying drawings, Figure 1 represents a face or front view of my improved adding-machine. Fig. 2 is a front view of the same, partly in section, on the line 2 2, Fig. 6, the front plate of the inclosing-casing being removed. Figs. 3 and 4 are re-

spectively horizontal sections on lines 3 3 and 4 4, Fig. 6. Fig. 5 is a horizontal section, also on line 4 4, Fig. 6, but showing the bottom view of the parts; and Fig. 6 is a vertical longitudinal sectional view of a part of the machine drawn on a larger scale.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents the inclosing-casing of my improved adding-machine. The casing is composed of a flanged top plate *a*, a flanged bottom plate *a'*, and a vertical side plate *a''*, all of sheet metal, the side plate being interposed between the flanges of the top and bottom plates and lugs *a'''* of the bottom plate, as shown clearly in Figs. 3 and 6. The top, side, and bottom plates are connected by corner-posts *b* and enlarged nuts *b'*, which latter also serve as feet or supports for the adding-machine; or they may be connected by any other suitable device.

On the top plate *a* are arranged a number of dials having the numbers 1 to 9, and between the numerals 1 and 9 circular openings *d*, through which the numerals of the rotary counting-disks, B B, arranged below the top plate *a*, are visible. The disks B B are applied to pivot-shafts *e*, which pass through the top and bottom plates of the casing A, and are provided at their upper ends with indices or hands B', which are keyed to the pivot-shafts *e*, and at their lower ends the pivot-shafts *e* are provided with buttons or handles *e'*, that serve for turning the disks B. The top plate *a* is further provided alternately at the left and right hand side of the openings *d* with stops *f*, which serve as abutments for the purpose of arresting the indices or hands B' when the same arrive at the zero or their starting point.

To the under side of each rotary disk B is applied a guide-box G, which forms connection with a second disk D, that turns with the disk B on turning the pivot-shaft *e*, and which disk D is provided with ten equidistant recesses *d* in its circumference.

In guide-slots in the opposite ends of the guide-boxes G are arranged slide-pieces E, which are provided with slots E' of sufficient length to permit the passage of the pivot-shafts *e* and serve also to define the extent of sliding motion of said slide-pieces. The slide-

pieces E extend at one side beyond the disk D, and are each provided with a tooth *h*, that enters into one of the recesses *d* in the circumference of the disk D, said recesses being made of greater depth than the remaining recesses, so that the teeth can pass into the same, so as to be entirely out of the way. The motion of the slide-piece E is prevented from being too free and easy by means of bent spring-plates *i*, which are interposed between the disks B and the slide-pieces E, as shown in Fig. 6, said spring-plates being also slotted or apertured, so as to provide the necessary space for the passage of the pivot-shaft *e*. The undersides of the recessed disks D are punched in such a manner that ratchet-teeth D^2 are formed around the pivot-shaft, which teeth engage corresponding teeth of ratchet-wheels F, that are located below said disks, said ratchet-wheels F being fastened to the pivot-shaft *e*, the ratchet device permitting the turning of the disks B and D from the ratchet-wheels F in one direction, while they cannot be turned in the opposite directions by said ratchet-wheels.

In place of the ratchet device described any other pawl-and-ratchet construction may be used, as the same effect would be produced, the one shown in the drawings being selected, as the same can be made of sheet metal and cheaper than any other pawl-and-ratchet construction. Below the pawl-and-ratchet wheels just described is arranged on the bottom plate *a'* of the casing A a plate A', which is provided with as many holes as there are pivot-shafts, and which is held in position by the pivot-shafts passing through it. From the plate A' are punched bent-up cams C, which are arranged at the left-hand side of the several disks D, said cams serving for the purpose of engaging the teeth *h* of the slide-pieces E and moving the latter out of the recesses in the disks D, so as to engage one of the recesses of the next adjoining disk and move the same on its axis for the distance of one tooth. When the tooth of the slide-piece E has passed over the cam C, the slide-piece E is returned to its normal position in the elongated recess of its disk D by a spring check-pawl *m*, which is supported in a bent lug of the plate A', two check-pawls being formed of one piece, so as to require but one supporting device for the same. The check-pawls also serve as clicks for the purpose of preventing the turning of the recessed disks D for a greater distance than one tooth, whereby the regular action of the adding-machine is kept up.

In addition to the parts above described, suitable washers M are interposed between the indices and the top plate *a* and between the top plate and the rotating disk B. Spring-cushioned plates N are interposed between the ratchet-wheels F and the cam-plate A', which spring-cushioned plates cause the ratchet-wheels F to engage with the ratchet-teeth punched on the disks D and produce the

usual motion of the working-disks of the machine. Washers N' are placed on the spring-plates N.

My improved adding-machine is operated as follows: The different dials are marked from the right-hand dial toward the left, respectively, with cents, dimes, dollars, ten dollars, &c., and provided with arrows which indicate the direction in which the indices or hands B' are to be moved. To add, the units are first set off successively on the cents or units disk, which is accomplished by taking hold of the button *e'* at the under side of the corresponding pivot-shaft *e* and bringing first the index from its initial position to the number required to be set off. Before starting an addition all the number-disks are first set in such a manner that the numerals 0 appear in the openings *d* of the top plate *a* of the casing A, as shown in Fig. 1. When the first index has been set to the required number, the button is turned in the opposite direction and the index brought back against its stop *f*. Simultaneously with the forward movement of the index the pawl-and-ratchet device D^2 F carries along the number-disk B and recessed disk D, and brings thereby the required number into the opening of the top plate of the casing. The next number to be added is then set off by means of the index and the disk turned in the same direction as before, so that the figure representing the sum of the two numbers appears in the opening of the top plate of the casing A. This operation is continued and all the units-figures are set off by means of the index-point and added together. As soon as the added figures amount to ten the tens-disk is moved by the tooth *h* of the slide-piece E on the units device, which tooth engages the recessed disk D of the tens device and turns thereby the tens-disk forward for the distance of one tooth. This operation is repeated whenever the sum of the units-numbers equals ten or more than ten, and so on. After all the units-numbers are set off by means of the index on the units-dial of the plate *a* of the casing A the sum of the same is indicated by the numbers which are visible through the openings in the front plate. The numbers of the tens-column are then set off by the index on the second dial in the same manner as the units were set off before, and in this manner the tens are added together, the hundreds-disk being turned in the same manner by the slide-piece of the tens-dial as the latter was turned before by the slide-piece of the units-disk. This is continued until all the figures are added together, the final result being indicated by the figures appearing in the openings of the front plate of the casing. The last disk of the series does not require a slide-piece, as the motion of the same does not require to be transmitted to another disk.

From the foregoing it is obvious that while the units-disk is turned in the direction of

the arrow by means of its pawl-and-ratchet device the tens-disk is turned in the opposite direction by its pawl-and-ratchet device, the hundreds-disks in the direction of the units-disks, and the thousands-disk in the same direction as the tens-disk, as is indicated by the arrows in Fig. 1. For this purpose it is also necessary that the stop for arresting the units-disk has to be at one side of the opening *d* of the units-dial, while the stop for arresting the tens-disk has to be at the other side of the opening of the tens-dial, and so on alternately.

The adding-machine herein described resembles to some extent a counting device, with this difference, however, that no consecutive numbers are set off and mechanically registered by a train of transmitting-gearing, but that the arbitrary figures are set off on each disk independently, and thus added together by mechanical means in a perfectly correct and reliable manner. The machine forms thus a cheap and convenient adding device for store-keepers and others who have to add quickly small figures in filling the orders of their customers, being useful instruments in the hands of boys and girls who wait on customers and make up the bills for the same.

As the entire device is made of sheet metal, it can be furnished at very low price, and is consequently within the reach of every one requiring the assistance of such a machine.

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

1. The combination of an inclosing-casing having a number of dials and openings at

the zero-points of said dials, number-disks below the top plate of the casing, recessed disks connected to said number-disks, slide-pieces guided intermediately between said disks and provided with a tooth at one end, pivot-shafts passing through the casing and disks, and provided with indices at their front ends and buttons or handles at their lower ends, pawl-and-ratchet devices for transmitting the motion of the pivot-shafts to the disks and fixed cams for imparting motion to the slide-pieces and bringing their teeth in engagement with the recesses of the adjoining disks and returning the slide-pieces to their normal position, substantially as set forth.

2. In an adding-machine, the combination, with a disk provided with figures from 0 to 9, a disk connected to the same and provided with a corresponding number of recesses in its circumference, a slide-box between said disks having guide-slots in the opposite ends, a slotted and spring-pressed slide-piece having a tooth at the outer end, a pivot-shaft passing through the disks and slide-piece, and gearing for turning the disk from the pivot-shaft, of a fixed cam below said disk for moving the slide-pieces in outward position, and a check-pawl engaging the recesses of the disk and serving for returning the slide-piece into normal position, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

WILLIAM LANG.

Witnesses:

W. REIMHERR,
JOHN ALONZO STRALEY.