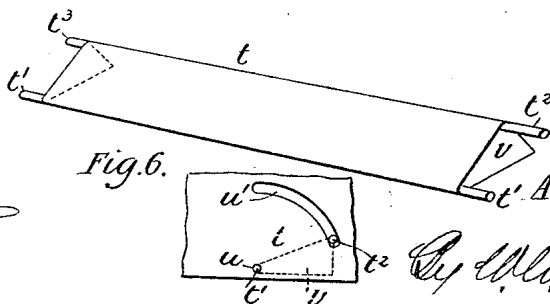
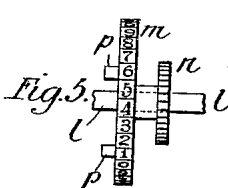
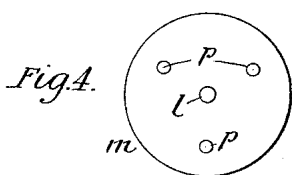
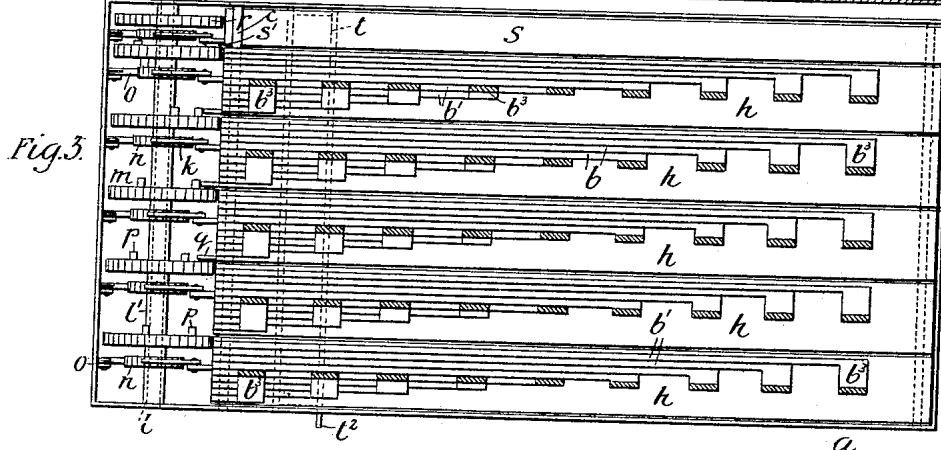
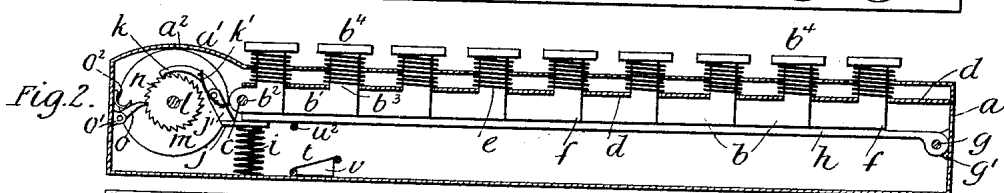
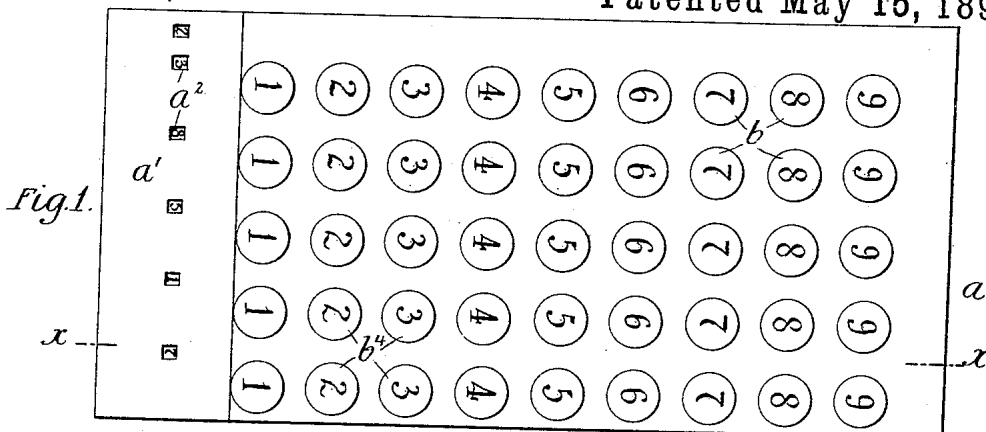


(No Model.)

A. B. LENNOX. ADDING MACHINE.

No. 519,960.

Patented May 15, 1894.



Witnesses
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Inventor

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UNITED STATES PATENT OFFICE.

ALFRED B. LENNOX, OF BAY CITY, MICHIGAN.

ADDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 519,960, dated May 15, 1894.

Application filed July 13, 1893. Serial No. 480,398. (No model.)

To all whom it may concern:

Be it known that I, ALFRED B. LENNOX, a citizen of the United States, residing at Bay City, in the county of Bay and State of Michigan, have invented certain new and useful Improvements in Adding and Calculating Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention has reference to certain new and novel improvements in adding and calculating machines and particularly to that class thereof in which the operation is effected by depressing certain keys and thereby actuating intermediate mechanism to disclose to view the calculation or other result required.

The object of my invention is to produce a machine of this character comparatively inexpensive in its manufacture, and which embodies few and simply constructed parts. In machines of this type heretofore produced, the operation is effected by intricate and complicated mechanisms involving considerable labor and expense in the manufacture thereof, and increasing the liability of wear and disorder.

The machine hereinafter described can be cheaply produced and by reason of the simplicity of its construction and operation, may be made to operate accurately for a considerable length of time.

To these ends my invention consists in a casing compact in form, which incloses the operating mechanisms; in a series of sets of keys, each set being adapted to operate a common disk having on its periphery figures or other characters which are exposed to view in turn through a slot or perforation in the casing; in a new and novel mechanism for causing a simultaneous revolution of two of the disks in the operation of carrying the units of one order to a higher order; and in the construction, relative arrangement and operation of the several parts embodied in my improved machine, all of which will hereinafter fully and clearly appear from a reading of the following description taken in con-

nection with the accompanying drawings which forms a part of this specification, and in which—

Figure 1 illustrates in plan view my improved adding and calculating machine. Fig. 2 is a vertical longitudinal section on line $\alpha-\alpha$ Fig. 1. Fig. 3, is a plan view, the top of the casing being removed, and the upper portion of the keys being broken away. Fig. 4 is an enlarged detail in elevation of one of the disks. Fig. 5, is a side elevation of the same and showing the relative position of the ratchet wheel employed; and Fig. 6 is a detail view of the locking device.

Referring to the drawings, the reference letter α denotes the casing which contains the mechanisms hereinafter to be described, the top of which at its front end is raised or arched slightly at α' to accommodate the index disks, openings α^2 being formed in the said top to expose a portion of the peripheries of said disks.

I have shown in the drawings an adding and calculating machine having five sets of keys, representing five orders of units, although it is evident that a greater or less number of sets may be employed dependent upon the character of the work to be done. The set or row of keys on the extreme right represents the lowest order of units, the next adjacent row represents the tens, the next, the hundreds, and so on. Each row or set of keys contains nine keys, and are numbered consecutively "1" to "9" beginning at the front of the casing.

The keys are represented by the letters $b b$ and are each formed preferably of sheet metal with the bar b' having a perforation b^2 therein, and the stem b^3 arranged at an angle to the bar and surmounted by a circular horizontal plate b^4 having thereon the designating figure or other character. As before stated each row of keys contains nine keys, the bars of which are of different lengths, the "1" key having the shortest bar, and the "9" key the longest, and the bars of the keys of all the sets are mounted on a common spindle or shaft c which is passed through the perforations b^2 and secured to the sides of the casing near the front end thereof. The key bars and stems are arranged vertically and side by side and in order that the plates b^4 shall be in

proper alignment, the stems are bent laterally before connection with the plates. Below the top of the casing is a false top d which with the top is slotted to receive the stems of the keys, and ee are coiled springs interposed between the said false top and the under side of the key plates which operate to return the keys to their normal or raised position after being depressed. The lower edges or heels ff of the key bars are normally in alignment or on the same level with each other, and being commonly pivoted, each key and heel are depressed an equal distance.

In the rear end of the casing is a spindle g which extends entirely across the same and is secured in lugs g' . Pivotaly secured at one end on this spindle are a series of lever plates h independently movable and which extend to a point at or near the spindle c on which the key bars are mounted. These lever plates are sufficient in length and breadth to accommodate all the bars of one set of keys, there being one plate to each set of keys. The plates are normally held in a raised position and in contact with the heels of the key bars by the action of coiled springs i which are interposed between the forward free end thereof and the bottom of the casing. The free end of these plates are depressed by the action of the keys, the heels of which contact with the upper surface at suitable points along the length thereof, and the keys being all pivoted on a common axis, the depression of the different heels will cause a difference in the extent of the depression of the plate, or in other words the depression given to the plate by the first key or "1" will be only one-ninth of the depression given by the last or "9" key, and the intermediate keys will depress the plate intermediate distances. To the free end of each plate is secured a lug j which has an arm j' thereon extending above the plate and to which is pivotaly secured a pawl k for a purpose to be hereinafter explained, said pawl having a spring k' as shown.

In the forward end of the casing and preferably in a line coincident with the line of openings a^2 is a shaft l secured at each end to the side of the casing. On this shaft are loosely mounted the index disks m shown in detail in Figs. 4 and 5 and which have fixedly and concentrically secured thereto a ratchet wheel n . On the periphery of the disks are arranged the numbers or other characters employed in the calculations, and which, as shown, run from "1" to "0." I prefer to triplicate these figures, and consequently divide the periphery into thirty divisions each of which is occupied by a figure, and the series "1" to "0" will therefore appear successively three times. The index disks and ratchets are separated from adjacent disks and ratchets by interposed sleeves l' , loosely mounted on the shaft, and in consequence the disks have each an independent movement. The disks are rotated through the ac-

tion of the ratchet and pawl k the latter being in turn actuated by the depression of the plate upon which it is arranged as before stated. The diameter of the ratchet wheel is preferably one-half that of the index disk in order that a one-thirtieth revolution of the former will impart twice as great a peripheral movement to the latter. In order to prevent the rotation of the ratchet wheel and disk in the reverse direction, I provide a pawl o pivoted in a stud o' on the front of the casing and held in contact with the teeth of the ratchet by a spring o^2 . On the opposite side of each of the disks are arranged three pins p equidistant from the center and from each other, there being one pin to each series of figures "1" to "0." The pins engage in a manner to be described a trip or finger on the adjacent lever plate and operate thereby the adjacent disk to accomplish "carrying." The fingers are shown at q , and are secured to the outer free ends of all the lever plates except that for the lowest order of units. In operation when a disk, take for instance the units disk, has been revolved to disclose the figure "9," a further revolution will cause one of the pins thereon to contact with the finger on the plate next in order, or tens, and will depress said plate sufficiently to move the tens disk a distance equal to one division, and expose the next higher figure thereon, and this operation is true of each succeeding disk. At the extreme left of the machine is an extra disk r which is operated by the adjacent disk through a false plate s , and a finger s' thereon, in a manner similar to that just described. By reason of this extra disk for which there are no keys, carrying may be accomplished to the next order of units.

In order to prevent the manipulation of the keys for any reason, as for instance to retain the number indicated on the figure disks, I provide a mechanism for locking the lever plates and keys in their normal or raised position, as follows: t is a locking bar which extends transversely across the machine beneath the lever plates, and preferably just back of the springs i as shown. This bar has at the lower end of each side projections t' which enter recesses u made therefor in the sides of the casing and which form a pivot for the bar. At the upper end of one side of the bar is a projection t^2 which is adapted to move within a curved slot w' in the casing and is of sufficient length to extend slightly beyond the outer side thereof to serve as a handle by which the plate can be raised to a vertical position to lock the lever plates, or can be depressed to unlock the same. At the upper end of the other side is a projection t^3 which is adapted to engage a hole w^3 made therefor in the other side of the casing. Sufficient longitudinal play is allowed for the bar to permit the same to be moved slightly to the right or left, and in operation when the bar is moved to a vertical position, by a slight pressure to the left the said pro-

jection ³ is caused to enter the hole ^u and the bar is thereby held in place. To unlock the machine the bar is moved sufficiently to the right to disengage the projection and hole and is then lowered. I provide at each end of said bar, cleats *v v* which are triangular in shape, and elevate the bar sufficiently above the bottom of the casing to form a stop for the lever plate of the "9" key when the latter is depressed.

The construction of my machine, it will be noticed, is on the simplest plan, and consequently will outlast a machine of a complicated character. The employment of the pivoted key bars and the plates render the same accurate at all times, as the limit of the movements thereof is always the same, and the class of lever of which the bars and plate are a type will impart no detrimental strain to the bearings, and will consequently preserve accuracy of action.

The general operation of my machine and the result will be apparent to those versed in the art. The machine when made is simple in its construction, neat and compact, and effective in its operation. It can be produced at comparatively small cost and the liability of wear and of getting out of order is reduced to the minimum.

I claim as my invention—

1. An adding and calculating machine comprising in combination, an outer casing, a plurality of sets of key bars of different lengths and commonly pivoted, a plurality of pivoted lever plates each having at its free end a pawl, a plurality of figure disks, ratchet wheels secured to said disks and adapted to be engaged by said pawls, openings in the casings above said disks, and means for simultaneously actuating two of the disks, substantially as and for the purposes set forth.

2. In an adding and calculating machine, and in combination with a figure disk, means for rotating same a predetermined distance consisting of a series of key bars of different lengths pivoted to a common center, a lever plate normally raised in contact with the heels

of said bars and oppositely pivoted thereto, a pawl on the free end of said plate, and a ratchet wheel secured to the disk and engaging said pawl, substantially as and for the purposes set forth.

3. In an adding and calculating machine, the combination with a figure disk, of a series of key bars of different lengths commonly pivoted, a lever plate oppositely pivoted and normally contacting with the said bars, intermediate actuating mechanism between said plate and the disk, and a spring for restoring the normal position of the plate, substantially as and for the purposes set forth.

4. In an adding and calculating machine and in combination with two adjacent disks, of a lever plate adapted to be depressed, mechanism between the plate and one of the disks for actuating the latter, pins on the other disk, and a finger on the plate in the path of the pins, whereby the disks may be simultaneously rotated, substantially as described.

5. In an adding and calculating machine, a plurality of sets of keys of different lengths commonly pivoted, a plurality of lever plates oppositely pivoted, one for each set of keys, pawls and fingers on the free ends of the plates, a plurality of figure disks having pins for engaging the fingers, and ratchet wheels for engaging the pawls, and auxiliary spring retainer pawls for engaging said ratchet wheels, substantially as and for the purposes set forth.

6. In an adding and calculating machine, a locking bar in combination with the lever plates having the pivotal projections, the handle, and the locking projection, said plates having a longitudinal movement, and operating in the manner described.

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

ALFRED B. LENNOX.

Witnesses:

RICHARD A. MCKAY,
MORRIS L. COURTRIGHT.