

No. 706,000.

Patented July 29, 1902.

J. L. LEVIN.
ADDING MACHINE.

(Application filed Nov. 18, 1901.)

(No Model.)

2 Sheets—Sheet 1.

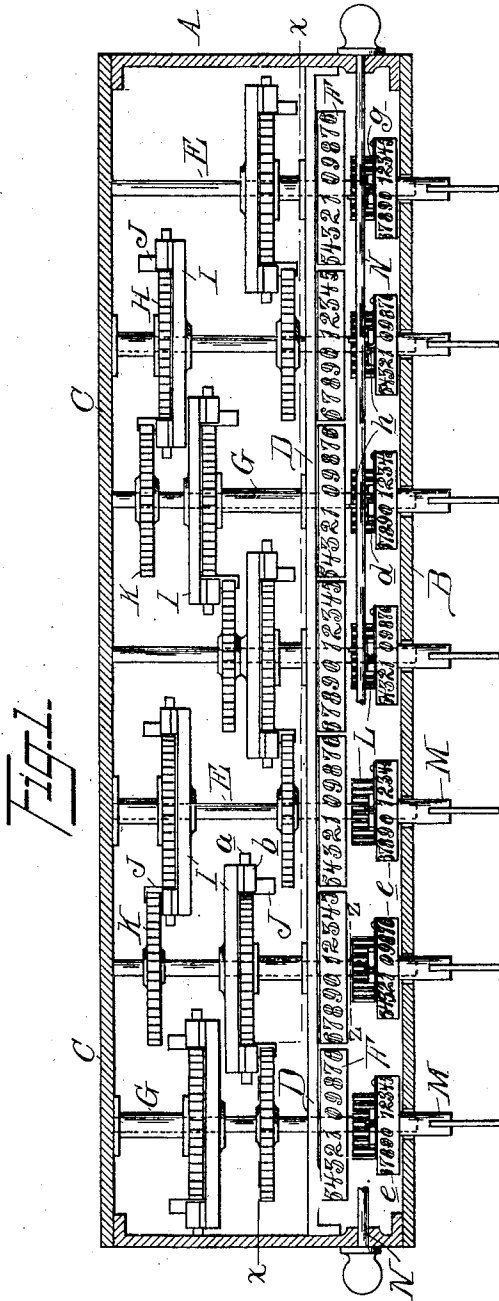
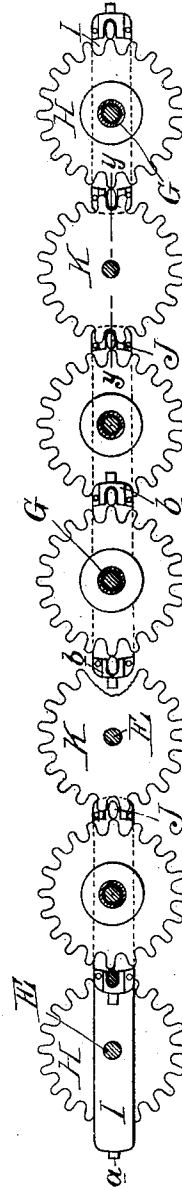


Fig. 1.



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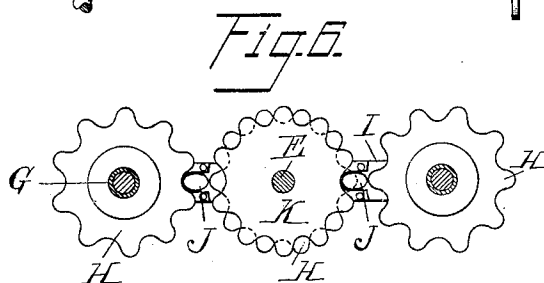
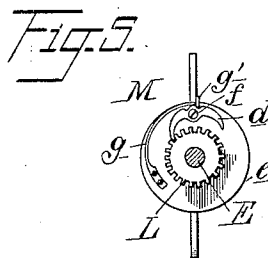
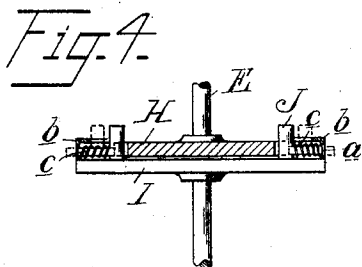
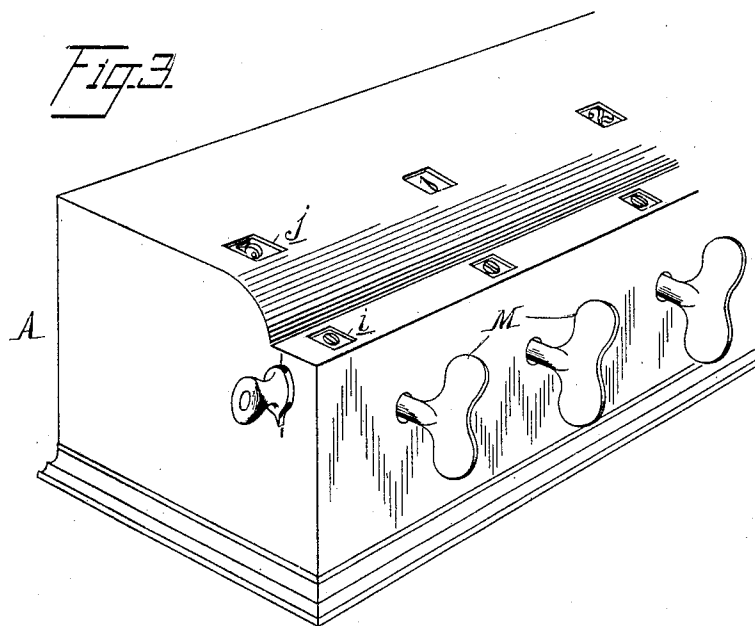
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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

JUDAH L. LEVIN, OF DETROIT, MICHIGAN.

ADDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 706,000, dated July 29, 1902.

Application filed November 18, 1901. Serial No. 82,626. (No model.)

To all whom it may concern:

Be it known that I, JUDAH L. LEVIN, a citizen of the United States of America, 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.

10 This invention relates to improvements in adding-machines, and has for its objects to provide a machine of simple, durable, and economic construction capable of use for addition or subtraction, as desired.

15 The invention consists in the novel construction and combination of the several parts, as will be hereinafter more fully set forth, and pointed out in the claims, reference being had to the accompanying drawings, 20 forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the views.

Figure 1 is a plan view of the machine, the casing being shown in section. Fig. 2 is a 25 vertical longitudinal section on line *xx*, Fig. 1, looking toward the rear. Fig. 3 is a perspective view of one end of the casing. Fig. 4 is a section on line *yy*, Fig. 2. Fig. 5 is a section on line *zz*, Fig. 1. Fig. 6 is a modified construction in which but one spring- 30 tooth is employed.

As shown in the drawings, A is the casing, provided with the front, rear, and intermediate walls B C D, in the rear and intermediate walls of which are journaled the series 35 of parallelly-arranged horizontal shafts E, carrying the number-carrying wheels F and, beginning with the left, representing units, tens, hundreds, thousands, tens of thousands, &c.

40 G represents flanged tubes sleeved upon the shafts E, stationarily secured to the casing at one end, and H represents gears secured to the free ends of said flanged tubes, so that as the shaft revolves said gears will remain stationary. 45

I represents bars fast upon the shafts E, adjacent to the fixed gears H and of a width slightly greater than that of the gear, and J represents spring-teeth mounted upon the opposite ends of said bars in operative relation 50 to the gears H K, said teeth being of a width equal to that of both gears and having a rear-

ward extension *a*, fitting within a suitable housing *b*, secured to the end of said bar, a spring *c* being sleeved on said rearward extension to hold said tooth in contact with the 55 teeth of the gear H, as shown in Fig. 4, the tooth J being so timed as to mesh with the next adjacent gear at each half-revolution and cause it to be turned through the space of one 60 tooth.

K represents gears similar to the gears H, but fast upon the shafts E and adapted to mesh with the spring-teeth J, so that as the first shaft to the right is turned through half a revolution the spring-tooth on said shaft adjacent 65 to the gear on the next shaft will be projected and cause the gear to be turned through one-twentieth of a revolution and the figure "1" to appear in opening, and so on with each half- 70 revolution of the shaft to the right. The next adjacent shaft to the left will be turned through one-twentieth of a revolution and cause the next higher number to appear in the opening in the casing. 75

It will be noticed that I have shown twenty teeth upon each of the gears H K and two sets of numbers from "0" to "9," making twenty in all on the number-carrying wheels, so that but half of a revolution of the shaft will be 80 required to cause one set of numbers from "0" to "9" to pass the openings *ij*, as it is practically impossible to make a complete revolution of the shaft without changing your hold upon the key for turning the same, and, 85 besides which, one's arm becomes so cramped and twisted in trying to make a complete revolution that one is apt to lose control of the key and fail to stop where desired, all of which is not the case where twenty teeth are 90 used and but half of a revolution is required to go the whole range of numbers, as it can be conveniently done in one continuous movement. In Fig. 6, however, I have shown a modified construction in which but one set 95 of numbers is employed and the shaft is required to be given a complete turn in order to bring in the whole range of numbers from "0" to "9." This machine is just as accurate and operates just as well as the other 100 but for the fact that the other is more convenient and quicker, and, besides, the operator has better control of the machine.

L represents ratchet-drums having a corre-

sponding number of teeth to those on the gears, said drums being preferably formed integral with the shafts E, near the outer ends thereof, and M represents keys adapted to fit over the ends of said shafts and butt up against said drums, each of said keys being provided with a double-acting pawl of any suitable construction, preferably as shown in Fig. 5, in which *d* is the pawl, pivotally secured on the enlarged end *e* of the key by a screw *f*, a spring *g* being adapted to hold said pawl in either of its adjusted positions. Upon the periphery of the enlarged end *e* of the key are placed a double set of numbers, similar to those on the number-wheel, but arranged in the inverse order, one for each tooth of the ratchet.

N is a rod extending across the machine in proximity to the spring-pawls, being provided on its opposite sides with pins *h*, adapted to contact with the spring-pawl on opposite sides of the pivot-pin and depress either side thereof, as desired, said pins at the same time acting as stops against which the enlarged end *g'* of the spring *g* is adapted to strike to prevent the key from being turned too far in its return movement. Any suitable stop may, however, be formed on the key instead. The rod N is provided with suitable knobs for turning it and a pointer, which, in connection with graduations on the casing, indicates exactly in what position the pins are, and should it be desired to use the machine for subtraction by simply giving the rod N a half-turn all the ratchets will be tilted in the opposite direction and held in that position by the springs *g*, and the machine is ready for subtraction. Another half-turn of the rod and the machine is again in its normal condition. It will also be noticed that the spring-tooth J travels on the gear H with its inner face all the time, so that its respective shaft E is accurately held in position at each one-twentieth of a revolution, and at each half-revolution the tooth is projected into mesh with the next adjacent gear K to the left at the proper time. This double function of the tooth J is of great importance, as unless the gears are actually centered and held in such position at each movement by said tooth the accuracy of the machine would soon be destroyed by reason of the lost motion and the tooth J would fail to engage with the gear K at the proper time to impart its proportionate movement to the next adjacent wheel, which is also centered in the same manner.

Supposing it is desired to add together six thousand and four hundred, the machine having first been set to zero the operator takes the thousands-key (the spring-pawls having first been thrown into the adding position by the rod N) and turns it to the right until the number "6" would show through the opening *i* and then turns it back till the lug or projection *g'* on the key would strike the pin *h*, in the backward movement of which the spring-pawl would have engaged with the

ratchet-drum and turned the shaft E until the number "6" would be exposed in the opening *j*. The operator would then take the hundreds-key and turn it to the left till the number "4" would show through the opening, the spring-pawl at the same time engaging the ratchet, and turn the key back till it strikes the stop *h*, the shaft being carried with it, and the number-wheel will disclose the figure "4" through the opening, each particular key being so actuated until the desired amount is obtained.

What I claim as my invention is—

1. In an adding-machine, a series of fixed gear-wheels spaced at intervals apart, and a corresponding series of shafts journaled in axial line therewith carrying a like set of gear-wheels and the number-carrying wheels, a series of spring gear-teeth carried by said shafts in traveling contact with said fixed gears and adapted at intervals to mesh with the movable gears to impart a predetermined movement thereto, and a series of keys sleeved on said shafts having ratchet-and-pawl connection with said shafts to impart movement thereto in either direction as desired.

2. In an adding-machine, a series of fixed gear-wheels spaced at intervals apart, and a corresponding series of shafts journaled in axial line therewith, carrying a like set of gear-wheels and the number-carrying wheels, of a series of spring-teeth carried by said shafts in mesh with the fixed gears and adapted to be projected into mesh with the movable gears at intervals to impart movement thereto, and a series of keys sleeved on said shaft and having a ratchet-and-pawl connection therewith, said keys carrying numbers corresponding to those of the number-wheels but arranged in the inverse order.

3. In an adding-machine, a series of fixed gear-wheels spaced at intervals apart, and a corresponding series of shafts journaled in axial line therewith, carrying a corresponding series of gear-wheels and number-wheels, carrying a double set of numbers from "0" to "9," of a pair of spring-teeth carried by each of said shafts, traveling in contact with the fixed gears and on opposite sides thereof, adapted at intervals to mesh with the next adjacent movable gear one tooth at a time, and a series of keys having ratchet-and-pawl connection with said shafts, said keys carrying numbers corresponding to those on the number-carrying wheels but arranged in the inverse order.

4. In an adding-machine, a series of fixed gear-wheels spaced at intervals apart and a corresponding series of shafts journaled in axial line therewith, carrying number-carrying wheels, and a corresponding series of gear-wheels, spring-teeth carried by said shafts in mesh with the fixed gears, and adapted to be projected at intervals into mesh with the movable gears, a series of ratchets carried by said shafts and a series of reversible pawls adapted to transmit motion to the ratchets through the

medium of a key and a reversing-bar for tilting the pawls in either direction.

5 5. In an adding-machine, a series of fixed gear-wheels spaced at intervals apart, and a corresponding series of shafts formed with ratchets journaled in axial line therewith, carrying number-carrying wheels and a corresponding series of gear-wheels, spring-teeth carried by said shafts in mesh with the fixed
10 gears and adapted to be projected at intervals into mesh with the movable gears, and a series of keys carrying numbers corresponding to those of the number-wheels but arranged in the inverse order, reversible pawls
15 carried by said keys adapted to transmit motion to said ratchets in either direction and a reversing-bar for actuating the pawls.

6. In an adding-machine, a series of fixed gear-wheels and a corresponding series of
20 shafts carrying a like series of movable gear-wheels and a series of number-carrying wheels, spring gear-teeth carried by said shafts meshing with the fixed gears and of a width greater than said gears and adapted at
25 determined intervals to mesh with the next adjacent movable gear to the left to impart a proportionate movement thereto, a series of ratchet-drums carried by said shafts, formed with teeth corresponding in number to those
30 of the gears, a series of keys sleeved on said shafts and bearing numbers corresponding to those of the number-wheels, but arranged in the inverse order, and a series of reversible pawls carried by said keys and adapted to
35 turn said shaft in either direction.

7. In an adding-machine, a series of shafts and number-carrying wheels and means for transmitting motion from one shaft to the other in proportion to the numerical values

which they represent, of a series of keys carrying numbers corresponding to those of the number-carrying wheels, but arranged in the inverse order, ratchet-and-pawl connections between said keys and shafts, means for reversing said pawl to turn the shaft in either
40 direction and a stop to limit the return movement of the key.
45

8. In an adding-machine, a series of fixed gear-wheels and a corresponding series of shafts carrying a like series of movable gear-wheels, and a series of number-carrying
50 wheels provided with two sets of numbers from "0" to "9," a pair of spring gear-teeth carried by each of said shafts meshing with the fixed gears on opposite sides thereof and adapted at intervals to move the next adjacent gear through the space of one tooth, said
55 spring-teeth being of a width equal to that of both gears, a series of ratchet-drums formed on the shafts and having teeth equal in number to those of the gears, a series of keys formed with a lug or projection sleeved on said shafts and bearing numbers corresponding to those of the number-wheels but arranged in the inverse order, a series of tilting
60 pawls carried by said keys and springs for holding said pawls in either direction, and a bar formed with pins for tilting said pawls to turn the shaft in either direction, said pins forming stops against which said lugs or projections are adapted to strike in the return
65 movement of the key.
70

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

JUDAH L. LEVIN.

Witnesses:

OTTO F. BARTHEL,
JACOB LEVIN.