(No Model.)

2 Sheets—Sheet 1.

L. C. SMITH.

ADDING MACHINE.

No. 414,335. Patented Nov. 5, 1889.

Fig: 1.

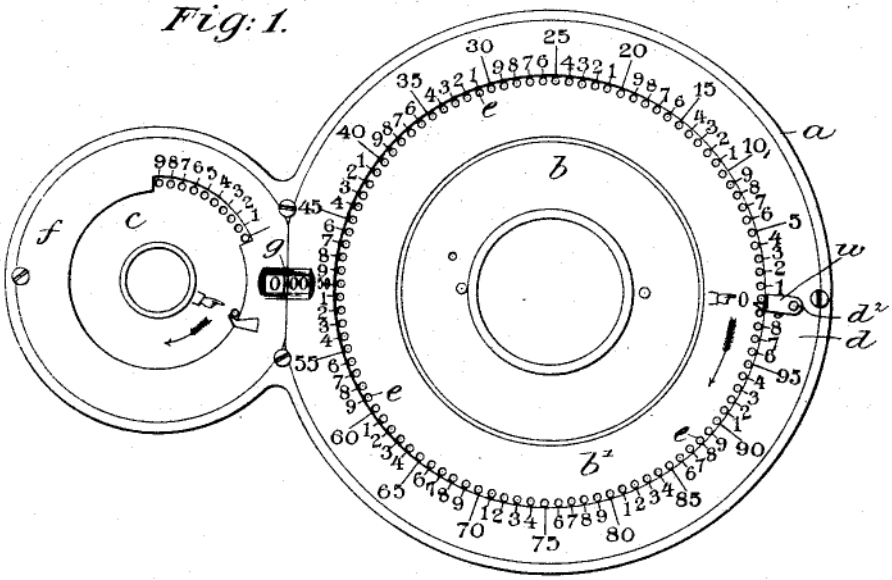

Fig: 2.

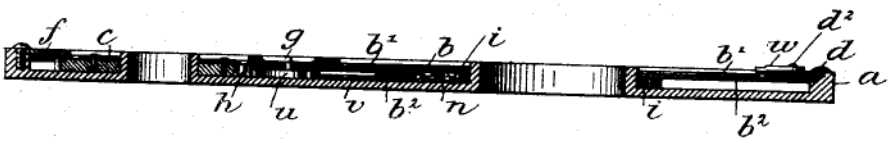

Fig: 5.

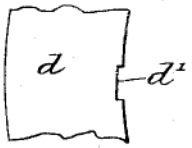

Fig: 6.

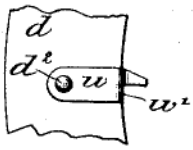

Fig: 7.

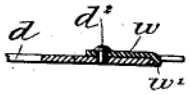

Fig: 8.

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(No Model.) 2 Sheets—Sheet 2.

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ADDING MACHINE.

No. 414,335. Patented Nov. 5, 1889.

Fig: 3.

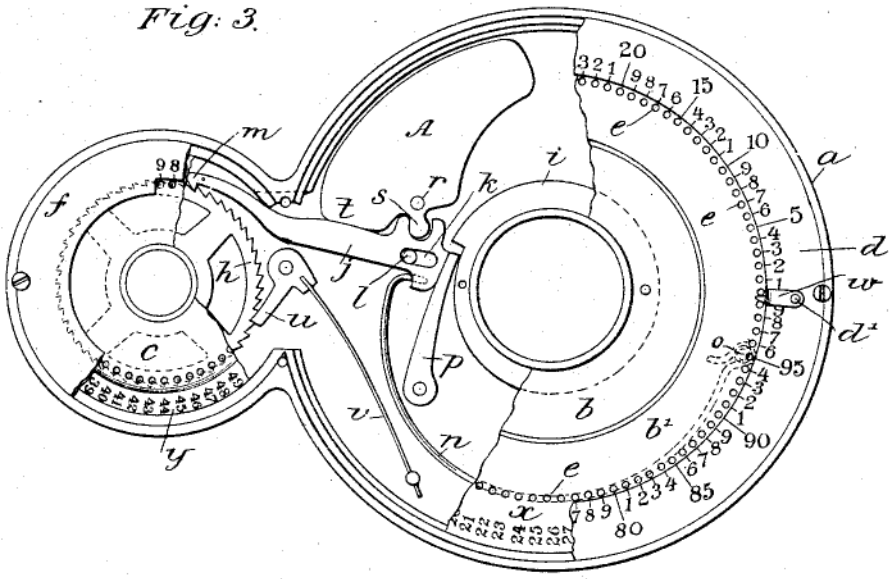
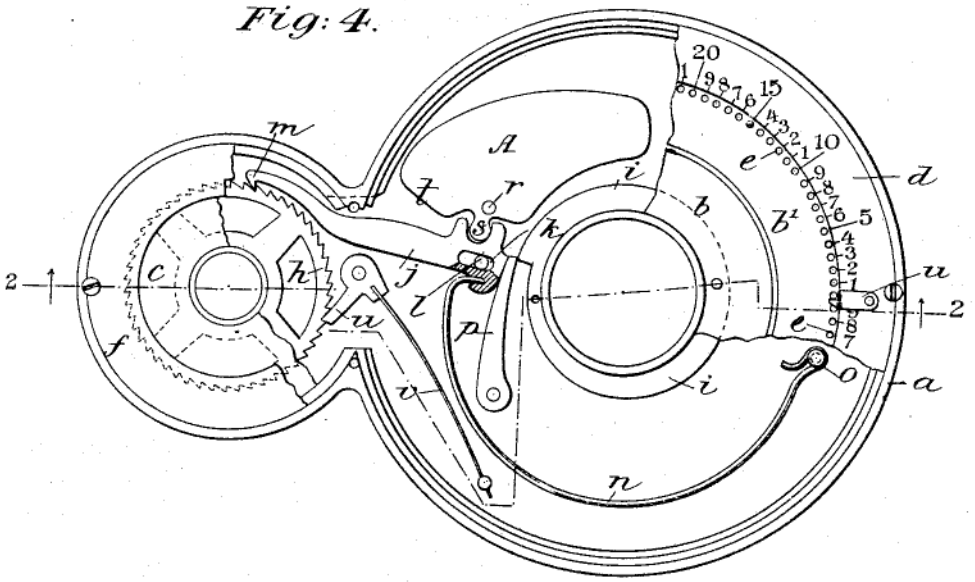


Fig: 4.



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UNITED STATES PATENT OFFICE.

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ADDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 414,335, dated November 5, 1889.

Application filed June 10, 1889. Serial No. 313,803. (No model.)

To all whom it may concern:

Be it known that I, LESTER C. SMITH, a citizen of the United States, and a resident of the city, county, and State of New York, have invented certain Improvements in Adding-Machines, of which the following is a specification.

My invention relates to that class of adding-machines wherein a disk bearing numerals is rotated intermittingly through the medium of a pawl and ratchet; and the principal object of the invention is to provide a positive intermittent driving mechanism whereby the driven disk is advanced but one tooth at each impulse.

In the accompanying drawings I have illustrated my invention as applied to and embodied in the well-known "Webb" adding-machine, which comprises as its essentials two rotating disks, one of which bears the "unit" and "ten" numerals, and the other the "hundred" numerals. The former drives the latter through the medium of a ratchet-wheel on the latter and an intermediate mechanism that is set in motion by the first-named disk.

The principal feature of my invention relates to improvements in this intermediate driving mechanism.

My invention will be fully described hereinafter, and its novel features carefully defined in the claims.

In the accompanying drawings, illustrative of my invention, Figure 1 is a face view of the adding-machine, and Fig. 2 is a longitudinal section of the same on line 2 2 drawn on Fig. 4. In this view the casing and disks are represented in mid-section. Figs. 3 and 4 are face views similar to Fig. 1, but showing the internal mechanisms in two different positions. In these views the disks and dials are partly broken away. Figs. 5, 6, 7, and 8 are detached fragmentary views, on a large scale, illustrating the manner of securing the stop to the ring-dial of the machine.

I will first describe the general construction of the adding-machine which embodies my improvements, premising that these features of the general construction are not new with me.

a represents the casing of the machine, in which are mounted on hollow journals the two disks *b* and *c* in the same horizontal plane and with their peripheries nearly in contact. On the larger disk *b* are stamped or marked the unit and ten numerals, (seen at *x* in Fig. 3,) and on the less disk *c* are marked the hundred numerals, (seen at *y* in the same figure.) The larger disk *b* is held in place on its journal by a ring-dial or annular plate *d*, on which is a series of one hundred numbered graduation-marks. In the larger disk is a series of one hundred perforations *e*, so placed as to stand adjacent to the inner edge of the ring-dial *d*. The less disk *c* is held in place on its journal by an annular plate *f*. The numerals indicating the "sum" appear at an aperture *g*, (seen in Fig. 1,) formed partly in the plate *d* and partly in the plate *f*. On the lower face of the less disk *c* is fixed a ratchet-wheel *h*, which has as many teeth as there are hundreds numerals on the disk to which the ratchet-wheel is fixed, and on the face of the larger disk *b* is fixed a volute cam *i*.

In operating this machine the larger disk is rotated by the insertion of a stylus in the sockets or perforations *e* therein, and at each rotation of the disk *b* the less disk is rotated to the extent of one tooth of the ratchet-wheel *h* through the intermediate mechanism.

In this class of adding-machine it is necessary, in order to insure accurate working, that the hundred-disk shall be moved through the proper distance, and no more nor less, at each impulse, no matter how rapidly the machine may be operated; and it is also important that the intermediate mechanism shall be simple and durable, so that it will not deteriorate too quickly nor get out of order readily. The mechanism I have devised for this purpose is fully illustrated in Figs. 3 and 4, and will now be described.

Mounted in the casing of the machine is a spring-pawl device *j*, which, from its construction and operation, I denominate a "hooked draw-bar." This draw-bar is provided near its inner end with a slot *k*, which is engaged by a stud *l*, fixed in the casing. The free end of the draw-bar is provided with a hook *m*, which engages the teeth of the ratchet-wheel *h*. A

parti-circular spring *n*, of steel wire, by preference is attached to the casing by means of a stud *o* at one end, and at its other end its extremity enters a socket in a shoulder on the inner end of the draw-bar. This spring has a twofold action. It retracts the draw-bar *j* and holds the hook on said bar in engagement with the teeth of the ratchet-wheel. Interposed between the base or inner end of the bar *j* and the volute cam *i* is a pivoted washer-arm *p*, the function of which will be pointed out hereinafter. At one side of the draw-bar *j* is arranged a device A, which I denominate a "hammer." This hammer may be of almost any contour; but as represented in Figs. 3 and 4 it consists of a plate of metal pivotally attached to the casing on a stud *r*, and as having a short arm or rounded lug *s*, which engages rather loosely a recess in the edge of the bar *j*. The face *t* of the hammer is adapted to strike and bear on the edge of the draw-bar *j* opposite to that on which the ratchet-wheel *h* is situated. It will be understood that as the cam *i* rotates (to the right, as seen in Fig. 3) the draw-bar *j* will be moved endwise, its hook *m* wiping over a tooth of the ratchet-wheel *h*, and the hammer A will be drawn back by reason of the engagement of the lug *s* thereon with the recess in the draw-bar. When the cam *i* shall have made nearly a rotation, the parts will have assumed the position seen in Fig. 4, the hook *m* being then in engagement with the ratchet-wheel teeth back of the first position. When the cam *i* passes, the spring *n* suddenly retracts the draw-bar, and its hook *m* imparts one impulse or partial rotation to the ratchet-wheel *h* and the disk *c*, to which said wheel is fixed. This sudden movement of the wheel and disk imparts considerable momentum thereto, and if the draw-bar were held up to the wheel, in the usual manner of spring-pawls, the momentum of the ratchet-wheel and disk might cause the wheel to advance after the draw-bar had been fully retracted far enough for the hook on said bar to wipe over and engage the next tooth. Such a possibility would render the machine wholly unreliable, and to prevent it I employ the hammer A, which serves partly to prevent the too sudden retraction of the draw-bar, but mainly to act as a brake on the ratchet-wheel at the proper moment, and thus destroy its momentum. The instant the draw-bar is retracted the hammer is brought up in such a manner as to strike the bar a smart blow, directed, as will be seen, in such a manner as to hold the hook *m* on the bar firmly in engagement with the ratchet-wheel *h*. The impact and pressure of the hammer on the draw-bar are ample to check the ratchet-wheel and destroy its momentum. A pawl *u*, provided with a spring *v*, to hold said pawl in engagement with the ratchet-wheel, furnishes a stop to prevent the backward rotation of the said wheel.

In setting the less or hundreds disk to zero the hook on the draw-bar *j* rides or wipes over the teeth of the ratchet-wheel and imparts a rapid vibration to that end of said draw-bar which stands adjacent to the volute cam *i*, and as the larger disk *b*, to which the cam is secured, is free to rotate axially it follows that if the end of the draw-bar were allowed to bear directly on the cam these vibrations of the bar would be likely to shift the disk *b* or move it about its axis; hence I employ the washer-arm *p*, interposed between the cam and draw-bar, as before described.

In the Webb adding-machine a stop is provided at the zero-point on the ring-dial *d* to arrest the stylus in adding, and I find that as ordinarily constructed this stop will not resist the hard usage to which it is subjected for any appreciable length of time. In Figs. 5, 6, and 7, which are fragmentary views, I have illustrated my improved construction of this stop. In these views the stop *w*, which will be of steel, preferably rests on the ring-dial *d*, with its top projecting over the inner edge of the same into the path of the stylus. A part of this projecting portion is bent down to form a lip *w'*, (seen in the section Fig. 7,) which engages a recess *d'* (seen best in Fig. 5) in the inner margin of the ring-dial *d*. At its outer end the stop is secured rigidly to the dial by a rivet d^2, which passes through both. Such a stop cannot well become loose, even with the hardest usage.

To impart stiffness to the larger disk *b*, as well as to prevent the stylus or pointed instrument from passing through and into the hollow of the casing, I construct the disk with a raised flat annular bead *b'*. (Best illustrated in the enlarged fragmentary sectional view of this disk seen in Fig. 8.)

In stamping up or embossing the disk *b* from sheet metal the perforations *e* extend entirely through it, and after the disk is thus formed a ring b^2 of sheet metal of the proper dimensions is placed in the recess at the under side of the disk formed by the embossing and is secured in place by soldering or brazing. This ring b^2 closes the perforations on the inner face of the plates, as will be seen.

Having thus described my invention, I claim—

1. The combination, with a rotatively-mounted cam and a rotatively-mounted ratchet-wheel, of an intermediate mechanism for communicating an intermittent rotary motion to said ratchet-wheel from said cam, said mechanism consisting of the pivotally-mounted hooked draw-bar actuated by the cam and its hooked end engaging the teeth of the ratchet-wheel, a spring which retracts said draw-bar, the pivoted hammer coupled to said draw-bar and operating as described, and a stop to prevent backward rotation of the ratchet-wheel.

2. The combination, with a rotatively-mounted cam and a rotatively-mounted ratchet-wheel, of an intermediate mechanism for communicating an intermittent rotary motion to said ratchet-wheel from said cam, said

mechanism consisting of a pivotally-mounted hooked draw-bar capable of longitudinal play on its pivot and its hook engaging the teeth of said ratchet-wheel, the parti-circular spring *n*, attached to a lug on said draw-bar to keep its hook in elastic engagement with the ratchet-wheel, and a stop to prevent backward rotation of said ratchet-wheel.

3. The combination, with the cam *i* and the ratchet-wheel *h*, of the hooked draw-bar *j*, pivotally mounted and slotted at its pivot to permit of endwise movement, and its hooked end engaging the teeth of said ratchet-wheel, the retracting-spring of said draw-bar, and the pivoted washer-arm interposed between the base of said draw-bar and the cam *i*, substantially as and for the purposes set forth.

4. The combination, with the ring-dial *d* of an adding-machine provided with a recess *d'* in its inner edge, of the stop *w*, secured rigidly to the face of said dial and having a lip *w'* engaging the recess *d'* therein, substantially as and for the purposes set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

LESTER C. SMITH.

Witnesses:
HENRY CONNETT,
J. D. CAPLINGER.