R. R. JAMES.
Adding-Machine.

No. 209,690. Patented Nov. 5, 1878.

Fig. 1.

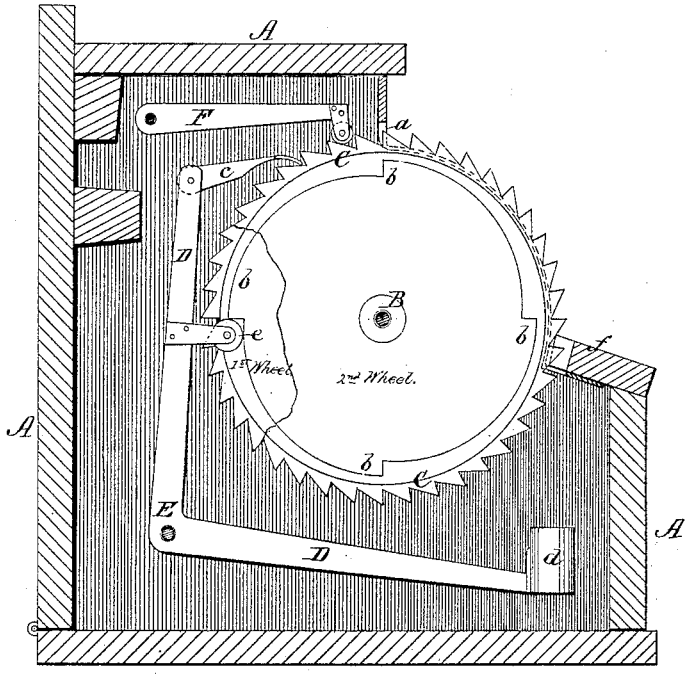
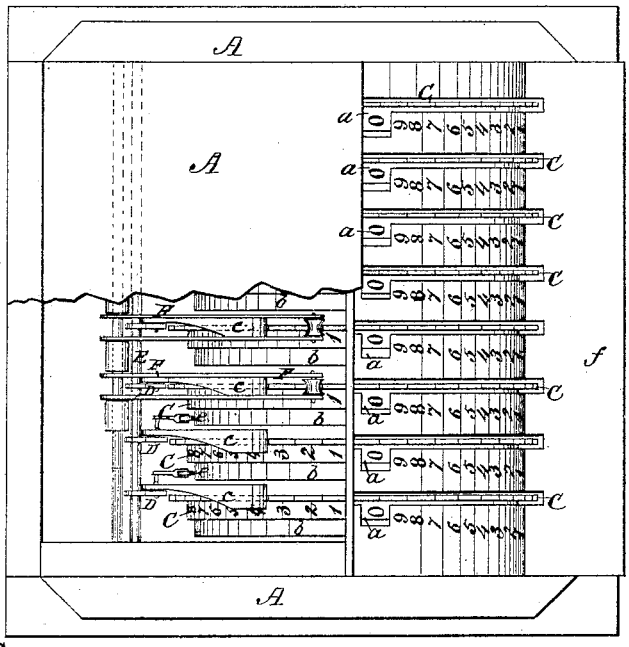


Fig. 2.



WITNESSES:

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UNITED STATES PATENT OFFICE.

REUBEN R. JAMES, OF RISING SUN, INDIANA.

IMPROVEMENT IN ADDING-MACHINES.

Specification forming part of Letters Patent No. **209,690,** dated November 5, 1878; application filed August 30, 1878.

To all whom it may concern:

Be it known that I, REUBEN R. JAMES, of Rising Sun, in the county of Ohio and State of Indiana, have invented a new and useful Improvement in Adding-Machines; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention is an adding-machine of a simple and comparatively inexpensive construction. The chief feature of the machine is a series of toothed revolving counting-wheels, which are inscribed on their peripheries with the nine digits and cipher, and mounted loosely on a common axis, and each having four lateral inclines or cams, which cause, at the proper time, a weighted pawl-lever to engage the next counting-wheel on the left, so as to carry ten when the numbers added on the wheel on the right exceed ten. The adding is effected by successively drawing down to a stop on finger-board the teeth of the counting-wheels which are opposite the numbers to be added, and the numerical result—*i. e.*, amount of the sums added—will be seen on the wheels in a series of slots or apertures in the case of the machine.

In the accompanying drawings, forming part of this specification, Figure 1 is a vertical section of the machine. Fig. 2 is a partly plan and partly sectional view.

The case or box A of the machine has a portion of its front curved upon the arc of a circle described from the axis B of the counting-wheels C, and such curved part is provided with a series of vertical parallel slots, corresponding to the counting-wheels in number, and through which the teeth of said wheels project far enough to be accessible. The nine digits are inscribed on each of the bars between the slots, and an aperture, *a*, is cut at the upper end of each bar, through which the numbers inscribed on the peripheries of the counting-wheels are visible. The periphery of the counting-wheels is divided into four equal parts, corresponding in location to the four cams *b* formed on or attached to their left sides. On each fourth part of each wheel the nine digits and cipher (0) are inscribed.

The right-angular levers D are pivoted on a rod, E, behind and below the counting-wheels, and are weighted at their lower ends, *d*, while pawls *c* are pivoted to their upper ends and engage the toothed peripheries of all the counting-wheels save the first or units wheel.

A short arm, carrying a friction-roller, *e*, is attached to the middle of each vertical part of each of the levers D. The several rollers *e* rest on the cams, and hence when the counting-wheels revolve the levers D are tilted on rod E, and, their pawls being thus drawn back, each will in its turn drop upon the next lower tooth of the counting-wheel of the next higher denomination, and when the roller *e* passes over the shoulder of the cam *b* the weight *d* on the end of each line will cause its attached pawl to push against the tooth of the wheel of the next higher denomination, and thus turn the said wheel one tooth for every ten spaces measured by the operating-cam *b* of the wheel of next lower denomination.

To prevent the wheels C revolving except when turned by hand or by the operation of the levers D, I apply stop devices or dogs F, consisting of pivoted bars carrying friction-rollers at their free ends, which rest on the toothed peripheries of the counting-wheels.

The operation of the machine is as follows: The counting-wheels are first all set on zero—that is to say, they are turned on their axis B until the ciphers appear in the apertures *a*. To enable this to be done with dispatch, those teeth which are opposite the several zeros are marked or colored to distinguish them from the others. Suppose the numbers to be added are 767 and 354. First, place the end of a finger, or else a pencil, pointer, or other suitable instrument, in the notch above the tooth of the first or units wheel C, which is opposite the number seven (7) on the bar contiguous to such wheel, and draw that tooth down to the finger-bar *f*. Then proceed the same for figure 4, and the amount of 7 and 4 (7 + 4 = 11) will appear in the first two right-hand apertures *a*. Then proceed to add the tens column, (6 + 5.) Place the finger on the tooth of the second or tens counting-wheel C which is opposite the number 6, and draw down to the finger-board *f*. Do the same for the next tens figure, (5,) and the result (12) will appear in

the second and third apertures. Then add the hundreds (7 + 3) in the same manner, on the third or hundreds wheel, and the result (1121) will appear in the apertures *a*. (767 + 354 = 1121.)

It will be observed that when the four (4) or second units figure was brought down on the units-wheel—since the sum of the units 7 and 4 is greater than ten (10)—the wheel was rotated so far that the roller *e* of the first lever D, would necessarily pass over the highest part of a cam. In doing so the pawl would be drawn back and caused to drop and engage the next lower tooth of the second wheel. The weight *d* of the lever would then cause the latter to tilt forward so that its pawl would turn the tens-wheel one notch, thus causing one (1) to appear in the second aperture *a*. Obviously the same operation must take place between the tens and hundreds wheels C, since the sum of the tens (7 + 5) is greater than ten, (10:) and ditto for the hundreds, seven and three, (7 + 3.)

What I claim is—

The adding-machine herein described, consisting of the right-angular levers pivoted at their angle on shaft E, and weighted at the lower end, the pawls pivoted to the upper end of said levers and the arms carrying friction-rollers, the cams and the toothed inscribed counting-wheels, and the slotted case A, all constructed and arranged to operate as specified.

REUBEN RODNEY JAMES.

Witnesses:
GEO. A. CRAFT,
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