(No Model.) 3 Sheets—Sheet 1.

E. W. VEST.

ADDING MACHINE.

No. 369,998. Patented Sept. 13, 1887.

Fig. 1.

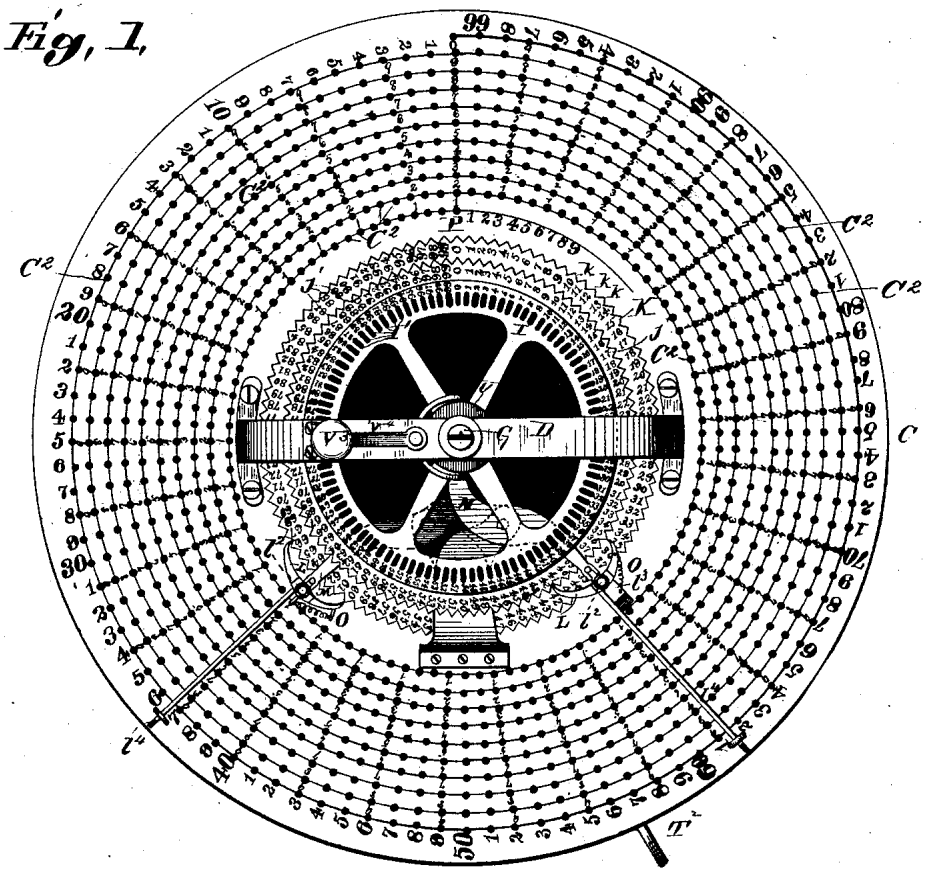
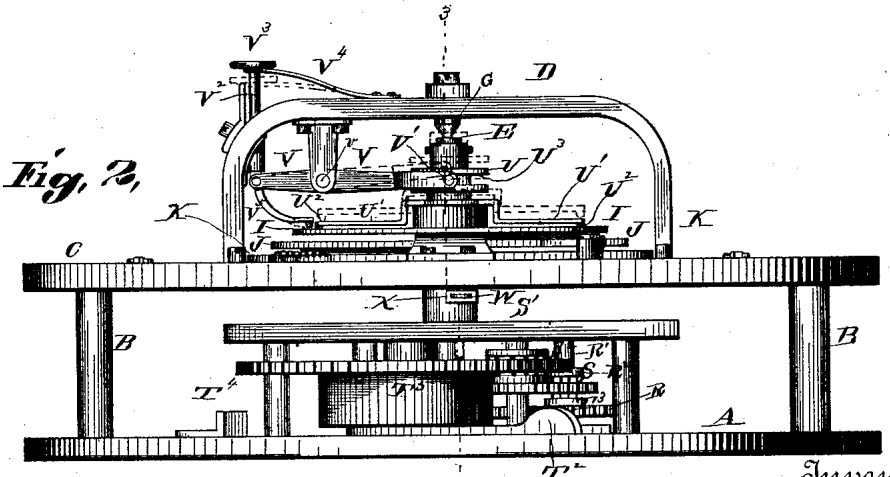


Fig. 2.



Witnesses
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(No Model.) 3 Sheets—Sheet 2.

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Fig. 4,

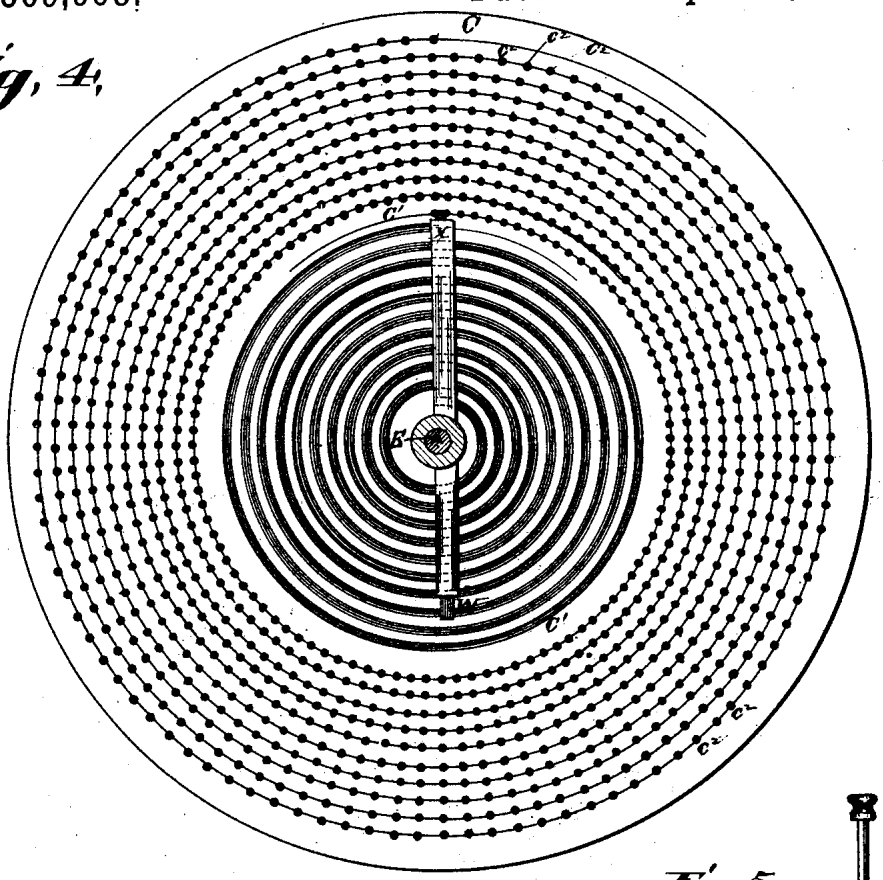

Fig. 5,

Fig. 3,

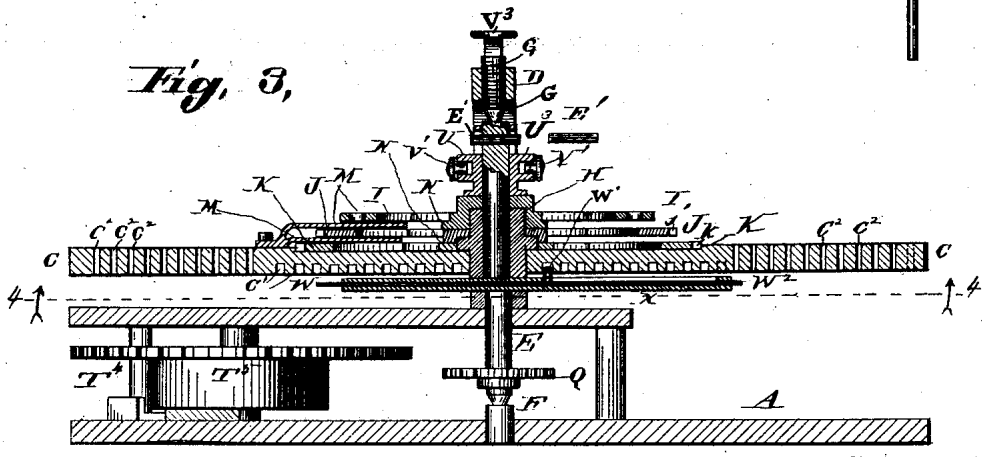

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Fig. 7,

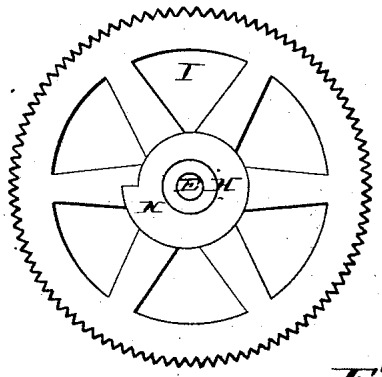


Fig. 8,

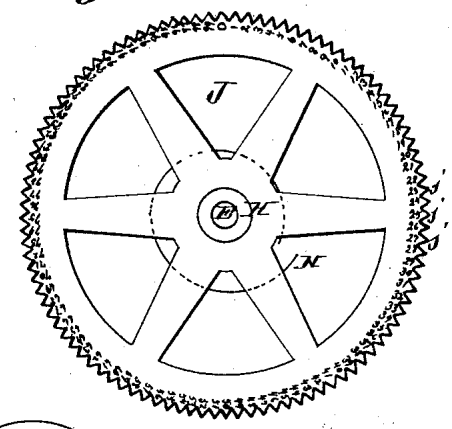


Fig. 9,

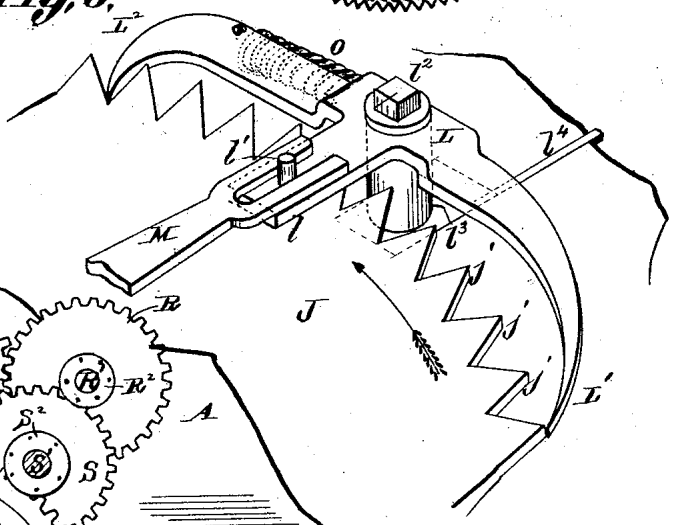


Fig. 6,

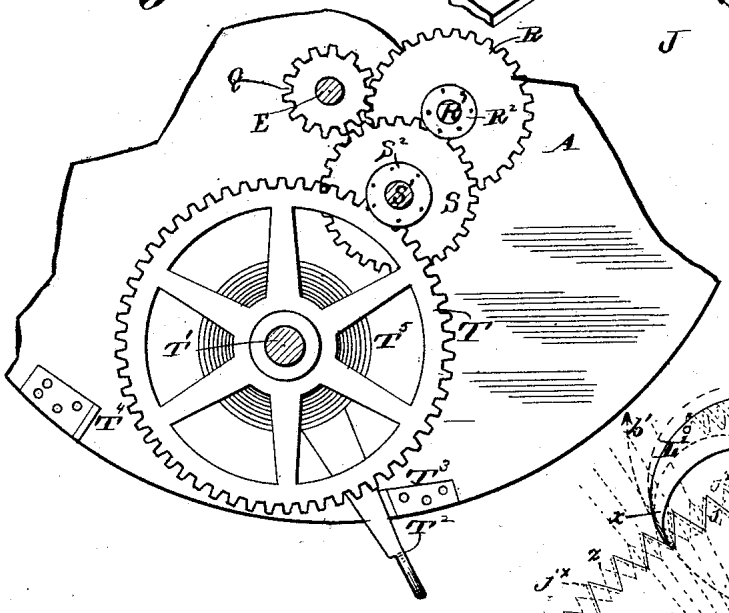
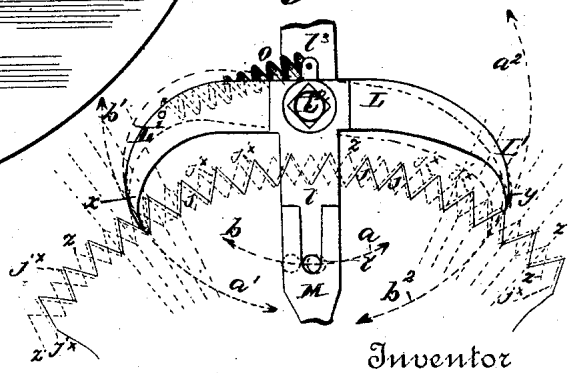


Fig. 10,



Witnesses
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J. B. Knight

Inventor
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UNITED STATES PATENT OFFICE.

EUGENE W. VEST, OF KEOKUK, IOWA.

ADDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 369,998, dated September 13, 1887.

Application filed July 17, 1886. Serial No. 208,282. (No model.)

To all whom it may concern:

Be it known that I, EUGENE W. VEST, a citizen of the United States, residing at Keokuk, in the county of Lee and State of Iowa, have invented a certain new and useful Improvement in Adding-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, and in which—

Figure 1 is a top view of the machine. Fig. 2 is a side view of the machine. Fig. 3 is a vertical section at 3 3, Fig. 2. Fig. 4 is a horizontal section at 4 4, Fig. 3, looking upward. Fig. 5 is a view of the stop-pin. Fig. 6 is a detail top view of the operating-gearing. Fig. 7 is a bottom view of the unit-wheel. Fig. 8 is a top view of the hundred-wheel. Figs. 9 and 10 are enlarged detail views of the escapement.

A is the bed-plate having standards B, upon which is fixed a round plate, C.

D is an arched standard or bridge.

E is a vertical shaft stepped in the box F and turning on a center-pin, G, at top. The center-pin G is screw-threaded, and is held in a screw-socket of the bridge D.

H is a hub fixed to the plate C and forming a bearing for the units-wheel I, hundreds-wheel J, and ten-thousand wheel K. The units-wheel is turned by direct connection with the shaft E, and at the end of each full turn operates the device by which the hundreds-wheel is moved one-hundredth part of a revolution, the wheel J having at its periphery one hundred teeth, *j*, somwewhat similar in form to escapement-teeth, acted on by the pallet L, which pallet is acted on by a lever, M, which is moved by a cam, N, upon the hub of the units-wheel I. The pallet has an arm, *l*, with a pin, *l'*, thereon, which pin is within a slot of the lever M, so that the oscillation of the lever M imparts a like movement to the pallet L. The lever M and pallet L are restored to their normal position by a spring, O, connecting the pallet with the plate C. The hub of the hundreds-wheel carries a similar cam, N, which, by similar lever M and pallet L, operates the ten-thousand wheel K by acting on the feed-teeth *k*. These teeth and pallets are like escapement teeth and pallets only in general appearance, and not in their operation. Ordinarily the office of a pallet is to regulate the rotation of a wheel upon which there is a constant pressure tending to turn it in one direction; but in the present device the wheel is rotated by the oscillation of the pallet itself, (instead of the pallets being oscillated by the rotation of the wheel.) In Fig. 10 the normal positions of the parts are shown by dotted lines. If while the parts are in normal position the end of the lever M is moved in the direction of the arrow *a*, (see Fig. 10,) the extremities of the pallet will be moved in the direction of the arrows a' and a^2 into the position shown by full lines. During this movement the extremity *x* of the pallet impinges against the near side of one of the inclined teeth *j*, and causes the wheel J to be turned to the left to the position shown by the dotted line $j^{\times}$, the extremity of the next tooth being a little beyond the extremity *y* of the pallet. If, now, the pressure upon the lever M be relieved, the spring O will move it in the direction of the arrow *b*, the extremities of the pallet being moved in the direction of the arrows b' and b^2 to normal position, (or the position shown by dotted lines.) During this movement the extremity *y* of the pallet impinges against the far side, the tooth directly under it, and causes the wheel J to move in the direction to the left to the position shown by the dotted line *z*. It will be seen, therefore, that each time the pallet is given a to-and-fro motion the wheel J is turned the distance between two adjacent teeth, or one one-hundredth of a revolution. Each of the wheels I, J, and K are numbered consecutively with figures from 0 to 99 just back of the periphery, and the sum of any numbers added is indicated by the radial line of numbers on these wheels at a certain point, P, of the machine.

The shaft E is turned by the mechanism now to be described: Q is a spur-pinion, fast upon the shaft E, and engaging with a spur-wheel, R, on a shaft, R'. R^2 is a lantern-wheel upon the shaft R', which is engaged by a spur-wheel, S, on shaft S'. S^2 is a lantern-wheel upon the shaft S', which is engaged by a spur-wheel, T, upon the shaft T'. T^2 is an arm extending from the shaft T'. The arrangement is such that by movement of the arm T^2 the shaft E is caused to revolve. T^3 T^4 are stops by which the movement of the arm T^2 is limited. The arm is carried back to its normal position against the stop T^3 by a

spiral spring, T^5, one end of which is fast to the bed-plate and the other fast to the shaft T'. I do not confine myself to the train of gear here shown and described, for any arrangement of gearing would answer which would impart to the shaft E the requisite number of rotations by a single movement of the arm T^2. A clutch is provided for connecting the units-wheel with the central shaft, the preferred form of which is as follows:

Upon that part of the shaft E which is above the units-wheel is a collar, U, having a limited vertical movement on the shaft and forced to rotate with the shaft by a cross-pin, E', fixed in the shaft and extending through vertical slots in the collar. The collar U carries a cross-bar, U', having at the ends depending teeth U^2, which, when the collar is in its lower position, as seen in Fig. 2, engage in two of the recesses or apertures, I', of the wheel I. Thus, when the bar U' is in this position, the wheel I will rotate with the shaft.

The collar U is lifted by the following means: U^3 is a circumferential groove in the collar, which receives the forked ends V' of a lever, V, which is fulcrumed at *v* to the bridge D.

V^2 is a push-rod connected to the outer end of the lever. The construction is such that when the push-rod descends the collar U rises, and vice versa. The push-rod carries a hand-knob, V^3.

V^4 is a spring by which the push-rod is sustained when the hand is away from the knob V^3. The push-rod has at its lower end a finger, V^5, which, when the rod is in its lower position, engages in one of the recesses or apertures I', so as to prevent the wheel I from turning. The finger V^5 engages in the outer ends of the apertures I', and the teeth U^2 engage in the inner ends of these apertures, and the bar U' revolves freely without coming in contact with the finger V^5. On the under side of the fixed plate C is a spiral cam-groove, C', having a number of full turns—ten turns being shown. This groove receives a stud, W', upon a sliding bar, W, which works in a guide-bar, X, secured in a horizontal position upon the shaft E. This bar W serves to arrest the rotation of the register-wheels in the manner hereinafter described, and will therefore be denominated the "stop" or "stop-bar."

It will be seen that when the shaft is in the normal position, as shown, (see Fig. 3,) the stud is at the inner end of the cam-groove, and that when the shaft is turned from this position the stud will travel outward in the cam-groove and the stud-bar will move endwise in the guide, thrusting the end W^2 of the rod outward beneath the plate C. The plate C has a spiral series of holes, C^2, the spiral lines of holes being parallel with the spiral cam-groove beneath the plate C. Ten full turns of the spiral series of holes are shown, each turn having one hundred holes. The holes are arranged in radial lines, each line being numbered, as shown, with a number at the end indicating the position of the radial line upon the plate. In addition, each circle of the series is numbered, the inner circle being numbered 1, the next 2, and so on to the tenth circle, which is numbered 10. Ten circles of holes C^2 are shown in the drawings, and ten circles in the spiral cam-groove C'; but there may be more or less of these circles, according to the size of the elementary amounts to be added together. The number-wheels (I J K) may be increased or diminished, according to the capacity desired in the machine. Thus, with a single wheel registration can be made up to the number of 99, while with two register-wheels registration can be made to the sum of 9,999, as each figure on the second wheel represents 100, and there are ninety-nine figures, and 10,000 would be indicated by the zero-marks both returning to the point. With three number-wheels, as shown, any sum less than one million could be indicated, while with four of these wheels any sum less than one hundred millions could be indicated.

The operation of the machine is as follows: Supposing the first line of figures to be added consists of 350, the pin Y, (shown in Fig. 5,) is pushed down through the hole C^2 in the line 50 of the circle 4, and then the shaft E is rotated by means of the arm T^2 until the end W^2 of the bar W comes in contact with the pin Y. Then the shaft E and wheel I will have made three and one-half revolutions, and the wheel J will have been turned three one-hundreths of a revolution, and figure 3 upon the hundreds-wheel and 50 upon the units-wheel will be at the point P.

To describe more particularly the operation of the stop-bar W in the registering of 350, it will be remembered that the end W^2 of this bar is moved outward a certain distance at each revolution of the shaft E, and it is not until after the third revolution has been completed that the end has been moved outward far enough to come in contact with a pin in one of the holes C^2 of the circle-number 4. As soon as the stop-bar W impinges against the stop-pin Y, the revolution of the wheel I and shaft E ceases. The collar U is now drawn up, releasing the teeth U^2 from the apertures I' and engaging the finger V^5 in one of the apertures. The hand of the operator is then removed from the arm T^2, and the spring T^5 carries the shaft E and the lever T^2 back to their normal position. While this is taking place the wheel I is held fixed in position by the finger V^5. Then the hand of the operator is removed from knob V^3, and another number may be added in the same manner. Any number less than one thousand may be added at one operation by putting the pin Y into the hole representing such number. As the wheel I completes each revolution, the ends L' L^2 of the pallet L move the wheel J the distance of one tooth, and the action is similar relatively to the wheels J and K. The pallet (or each pallet where there are more than one) L is fulcrumed on a pin, l^2, upon a sliding block, l^3, secured to a rod, l^4. The purpose of this construction is to allow the

pallet to be pulled out of connection with the scape-teeth by means of the rod l^4, so as to allow the wheels to be quickly adjusted to the normal or other position, or, in other words, to be set at zero. The cross-bar U′ is shown composed of two arms projecting from the collar U in opposite directions. One of these arms may be dispensed with, as it is not essential that there should be two. The machine, as shown, will add numbers having three places of figures, (that is, any number under one thousand.) To add a larger number, the plate or disk C may be made of larger diameter, and the spiral groove C′ and lines of holes C^2 extended; or two or more of the machines may be put side by side. In the latter case the units, tens, and hundreds would be registered on the first machine, the thousands, ten thousands, and hundred thousands on the next machine, and so on.

I claim as my invention—

1. In an adding-machine, a disk having a spiral series of holes and a stop adapted to be inserted in any one of said holes, in combination with the registering-wheels, means for rotating them, and a stop carried by one of said wheels and adapted to impinge against the stop first named for arresting the movement of the parts, substantially as set forth.

2. The combination, with the revoluble registering-wheels, of a disk having a spiral series of holes, a stop-pin adapted to be inserted in any one of said holes, and a stop carried by one of said wheels and adapted to impinge against the stop-pin for arresting the rotation of said wheels, substantially as set forth.

3. In an adding-machine, the combination, with the registering-wheels and a movable stop-bar having connection with the units-wheel, of a disk having a spiral series of holes, a stop-pin adapted to be inserted in any one of said holes, and means for moving the end of the stop-bar the distance between two adjacent rows of holes each time there has been a complete revolution of the units-wheel, substantially as set forth.

4. In an adding-machine, the combination, with the revoluble registering-wheels and a sliding stop-bar movable in unison with the units-wheel, of a fixed disk having a spiral series of holes, a movable stop adapted to be inserted in any one of said holes, and means for moving the sliding stop-bar the distance between two adjacent rows of holes at each complete revolution of the units-wheel, substantially as set forth.

5. In an adding-machine, the combination, with the registering-disks and a disk having a spiral series of holes and a spiral cam-groove, of a stop-pin adapted to be inserted in any one of said holes and a stop-bar moved by the cam-groove the distance between two adjacent rows of holes each time the units-wheel makes a complete revolution, substantially as set forth.

6. In an adding-machine, a disk having a spiral series of holes and a corresponding cam-groove, in combination with a shaft passing centrally through it, a movable stop-bar carried by said shaft and engaging in said cam-groove, the registering mechanism actuated by the rotation of the shaft, and a stop-pin adapted to be inserted in any one of said holes for arresting the rotation of the shaft, substantially as set forth.

7. In an adding-machine, a disk having a spiral series of holes and a corresponding cam-groove, in combination with the registering-wheels, means for turning them, a stop-pin adapted to be inserted in any one of said holes, and mechanism operated by the cam-groove for coming in contact with said stop-pin and arresting the further rotation of the registering-wheels, substantially as set forth.

8. The combination of the shaft E, having a clutch-connection with the register-wheel I, a stop-bar, W, sliding transversely to the shaft, having a stud, W′, and a fixed plate, C, having a spiral cam-groove, C′, in which the stud works, and a spiral series of holes, C^2, for the purpose set forth.

9. The combination of the shaft E, a register-wheel turning freely thereon, a clutch-collar, U, turning with the shaft but having vertical movement thereon, a cross-bar fixed to the collar and having teeth engaging the register-wheel, and a lever constructed to lift the collar, and having a finger engaging the register-wheel when the teeth of the cross-bar are disconnected therefrom, for the purpose set forth.

10. In an adding-machine, the combination, with the units-wheel, of the operating-shaft, the sliding clutch mounted thereon, the detent for preventing retrograde rotation of said wheel, and a single operating lever, whereby the clutch is moved into and the detent out of engagement simultaneously, and vice versa, substantially as set forth.

11. In an adding-machine, the combination, with the registering-wheels and the operating-shaft, of the sliding clutch-sleeve U, the cross-bar U′, the forked lever V, engaging at one end with said sleeve, the depressible operating-rod V^2, engaging the other end of the lever V and having the extension V^5, and the elevating-spring V^4, substantially as set forth.

12. The combination of the shaft T′, the lever T^2, spring T^5, the shaft E, with suitable gearing between the shafts, a register-wheel turning loosely upon the shaft, a clutch-connection, U U′ U^2, and actuating-lever V, having a finger, V^5, engaging the register-wheel when the clutch is disengaged, substantially as set forth.

13. The combination, with the toothed wheel, the pallet engaging therewith, and means for oscillating said pallet, of the slide l^3, to which said pallet is secured, substantially as set forth.

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Witnesses:
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EDW. S. KNIGHT.