No. 728,502. PATENTED MAY 19, 1903.

W. L. SANDAGE.

COUNTER.

APPLICATION FILED SEPT. 8, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

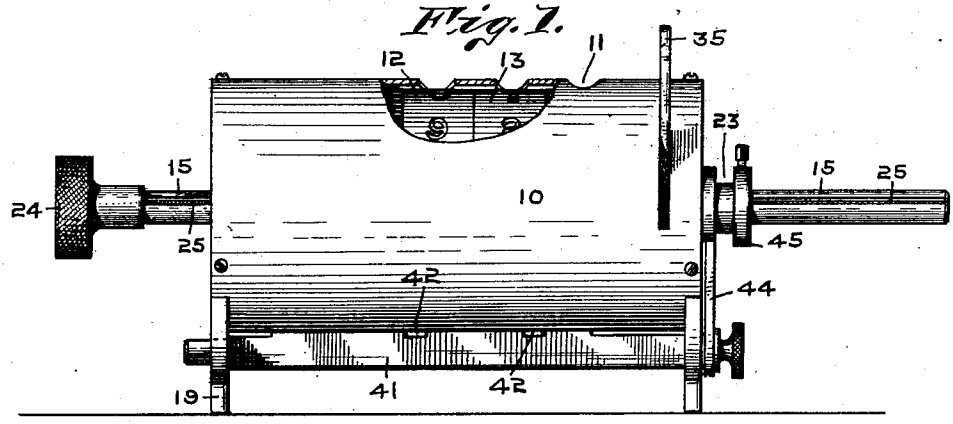
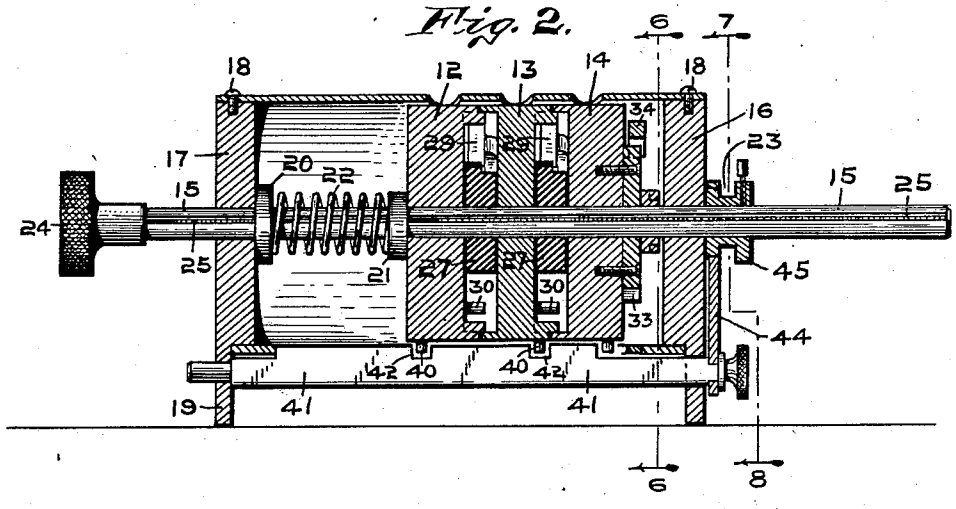


Fig. 2.



WITNESSES:

F. W. Koerner.

Nellie Allemong.

INVENTOR.

William L. Sandage

BY

V. H. Lockwood.

ATTORNEY.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 728,502. PATENTED MAY 19, 1903.

W. L. SANDAGE.

COUNTER.

APPLICATION FILED SEPT. 8, 1902.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

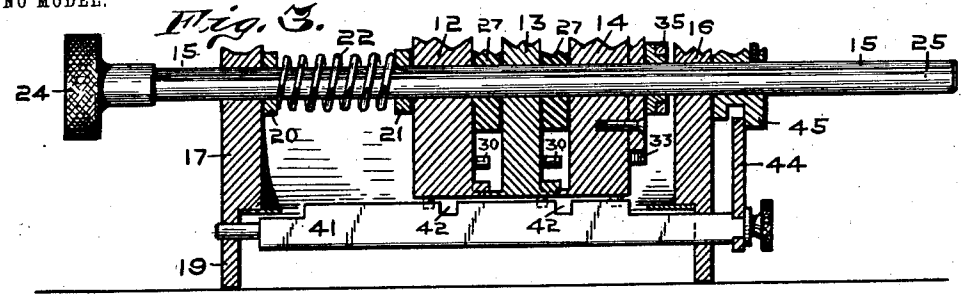


Fig. 4.

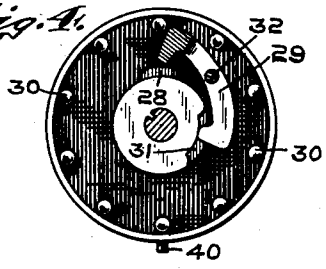


Fig. 5.

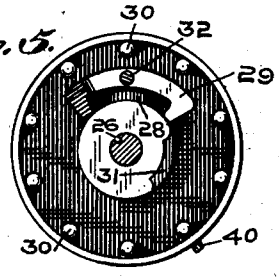


Fig. 6.

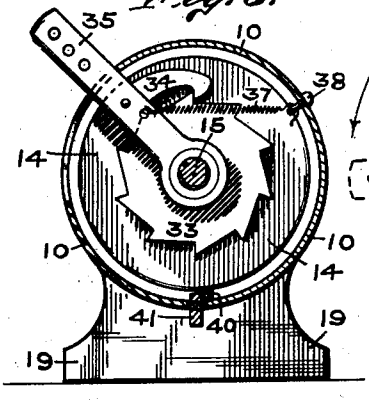


Fig. 7.

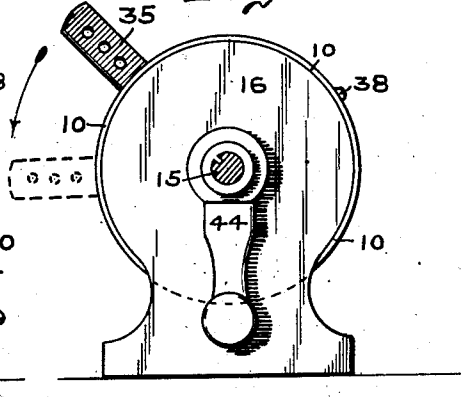
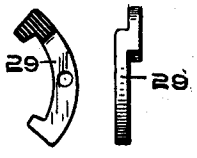


Fig. 8.



WITNESSES:

F. W. Horner.

Nellie Allemong.

INVENTOR.

William L. Sandage.

BY

V. H. Lockwood.

ATTORNEY.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 728,502. Patented May 19, 1903.

UNITED STATES PATENT OFFICE.

WILLIAM L. SANDAGE, OF INDIANAPOLIS, INDIANA, ASSIGNOR OF TWO-THIRDS TO THOMAS TAGGART AND WILLIAM W. SPENCER.

COUNTER.

SPECIFICATION forming part of Letters Patent No. 728,502, dated May 19, 1903.

Application filed September 8, 1902. Serial No. 122,534. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. SANDAGE, of Indianapolis, county of Marion, and State of Indiana, have invented a certain new and useful Counter; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like figures refer to like parts.

The object of this invention is to mount on a single rod capable of rotation registering mechanism wherein the number of registering-wheels can be readily increased or a number of sets of registering-wheels independently operative and to provide means for simultaneously resetting all the registering-wheels on the rod at zero. To that end I provide registering-wheels which are loosely mounted on the rod and a cam-plate splined on the rod intermediate the wheels, means actuated by the cam-plate for carrying the numerals from one wheel to the next, an adjustable resetting-bar for stopping the registering-wheels while being reset, and means for holding the rod from rotation during the registering and to permit its rotation during the resetting of the wheels. These and the other features of the invention will be more fully understood from the accompanying drawings and the following description and claims.

In the drawings, Figure 1 is a side elevation of the device with a part of the casing broken away. Fig. 2 is a central vertical section of the same while in condition for registering. Fig. 3 is the lower half of Fig. 2, showing the resetting-bar in position to stop and reset the registering-wheels. Fig. 4 is a side elevation of one of the registering-wheels, the plate between it and the adjacent wheel, and a pawl which is on the adjacent wheel, but which actuates the wheel shown, the rod and the pawl pivot-pin being in section and the parts being in actuating position. Fig. 5 is the same with the pawl not in actuating position. Fig. 6 is a cross-section of the device on the line 6 6 of Fig. 2. Fig. 7 is a section on the line 7 8 of Fig. 2. Fig. 8 shows detail views of the pawl.

The construction herein shown to illustrate the idea constituting my invention is provided, in the first place, with a cylindrical casing 10, having in its upper portion the holes 11, through which the numerals on the registering-wheels 12, 13, and 14 are disclosed. Said registering-wheels are loosely mounted on the rod 15, which has bearings in the ends 16 and 17 of the casing, the cylindrical portion of the casing, so it can be rotated, being secured to the ends by screws, and there being lugs or extensions 19 downward from said ends for supporting the device. The rod is prevented from lateral movement to the right by the collar 21 bearing against the wheel 12 and in the other direction by the collar 23. The wheels are held snugly in place by the spring 22, that presses against the collar 21 and lies between it and the loose collar 20. A thumb-screw 24 is used for rotating the rod. The collar 23, combined with the arm 44, holds the rod stationary from rotation while the device is in use. There is an escapement mounted between each pair of wheels through which one wheel can move the other. To that end the rod 15 has a groove 25 extending longitudinally in its surface to receive the spline 26 of the cam-plates 27, located between the registering-wheels. These plates are shown in Figs. 4 and 5 and do not rotate during the actuation of the registering-wheels. They are provided with an actuating-lug 28 on the periphery adjacent the registering-wheels which it actuates through the head of the pawl 29 and the pins 30. Said cam-plates are provided also with a recess 31 in the periphery on the side thereof farthest removed from the registering-wheel which the cam-plate actuates. As shown in Fig. 2, the lug 28 is only one-half the thickness of the cam-plate 27, being on the left half, while the recess 31 is only one-half the thickness of the cam-plate 27, but, as shown in Fig. 5, is in the opposite half from that containing the lug.

The pawl 29 is mounted on the wheel adjacent that shown in Figs. 4 and 5—that is, the companion wheel—by means of the pivot-pin 32 between the ends of the pawl, so that it is an escapement-pawl having a head and a heel, with a pivot between the head and the heel. The adjacent face of said companion wheel is like that shown in Fig. 5, omitting the pins 30. The units-wheel 14, therefore,

carries one of the pawls 29, and that pawl, by coöperating with the adjacent cam-plate 27 at each revolution of the units-wheel, moves the tens-wheel 13 one notch. The opposite face of the tens-wheel likewise carries the pawl 29, that operates the hundreds-wheel 12. The cam-plate 27, with the lug 28 thereon, being stationary at each revolution of the wheel carrying the pawl 29 the head of the pawl rides upon the lug 28, as shown in Fig. 4, which causes it to engage one of the pins 30 and move the same one-tenth of a revolution—that is, until the head of the pawl passes over and off the lug 28. The heel of the pawl rides normally on the periphery of the cam-plate 27 until it comes to the recess 31 and enters it at the same time that the head 29 rides upon the lug 28. Therefore the heel of the pawl during nine-tenths of the revolution of the wheel, by riding on the periphery of the plate 27, holds the head of the pawl out of engagement with the pins 30 on the wheel to be actuated. In order to accomplish this result, it is necessary, therefore, that the head of the pawl be offset somewhat from the body thereof, as seen in Fig. 8, in the direction of the wheel to be actuated by it, so that it will ride upon the lug 28 on that side of the cam-plate 27, while the heel of the pawl will enter the depression 31 on the other side of the cam-plate and for nine-tenths of a revolution run on the periphery of the plate past the lug 28. With this construction the use of springs is avoided.

The foregoing description explains how power is transmitted from one wheel to another in order to carry the computation from units to tens and from tens to hundreds, and so on, by placing additional registering-wheels of similar form and arrangement, with the accompanying plate 27 and pawl 29, intermediate the end wheels 12 and 14, and, therefore, slipping the wheel 12 farther to the left, as shown in Fig. 2, the computation can be carried further than three numerals which is the capacity of what is herein shown. Also a number of sets of such registering-wheels may be mounted on a rod like 15 and be independently operated.

The units-wheel in this device shown is actuated by the ratchet 33, that is secured to the outside face of said wheel and the gravity-pawl 34, which at one end is pivoted to the actuating-lever 35. This lever is fulcrumed on the rod loosely and extends through the slot 36 in the casing and can be actuated by any external means. The slot 36 limits the throw of said lever 35, so that it will give to the units-wheel one-tenth of a revolution at each actuation. It is returned to normal by the spring 37, that is fastened to it at one end and at the other end to the casing by a screw 38.

The registering-wheels are reset by turning the rod on which the wheels are mounted until the lugs 40 on the periphery thereof come in contact with the resetting-bar 41, as shown in Fig. 3. It is mounted at each end in the lower extensions 19 from the end pieces of the casing, so as to be longitudinally slidable. The upper edge is provided with notches 42, that permit the lugs 40 of the registering-wheels to pass when in their operative position, as shown in Fig. 2. The upper edge of said bar extends into and operates within a longitudinal slot 43 in the bottom of the casing, and the ends of said slot limit the lateral movement of said bar. There is also an arm 44 outside, that is secured to said bar, that engages the flat lower surface of the collar 23 and prevents the rod 15 from rotating, since said collar has a spline on it that fits in the groove in the rod. When the bar 41 is moved into the position shown in Fig. 3 for resetting the wheels, said arm 44 disengages the flat surface of the collar 23 and moves it to the right against the stop 45 into an annular groove in said collar, whereby it permits the rod and the wheels thereon to be rotated. When reset, the bar 41 is moved back into the position shown in Fig. 2, and then the arm 44 and collar 23 hold the rod 15 and cam-plates 27 stationary. Less than one revolution, therefore, of the wheels will reset all of them until the lug 40 on a wheel engages the bar 41. The cam-plate and pawl merely rotate with the wheels without changing their relative positions. After one wheel is stopped an adjacent wheel must still be moved somewhat farther to reset it. The relative positions of the intermediate cam-plate and pawl will be changed somewhat—that is, the cam-plate will rotate independently of the pawl 29—and therefore it is important that the lugs 40 be set at a point on the periphery of the wheels that is intermediate the pins 30, so that as the head of the pawl 29 is elevated by the cam-plate it will not engage any pin 30, but will move upward between two of said pins and back without coming in contact with them. The relative position, therefore, of the lugs 40, the pins 30, the pawls, and the cam-plates becomes important during the process of resetting to enable a wheel to be turned after the adjacent wheel has been stopped by the resetting-bar.

This invention makes a complete and rapid adding-machine by removing the casing and actuating each wheel independently or providing independent means for actuating each wheel. Since the wheels are independently mounted, they can be independently actuated forward, but not backward. Therefore the tens or hundreds wheel can be rotated for adding a tens or hundreds numeral. The number of wheels can be multiplied to accommodate any sort of addition. When a wheel is moved forward—say the tens-wheel—at each revolution it will move the hundreds-wheel; but it will have no effect on the units-wheel. This arises by reason of the cam-plate and pawl intermediate the wheels. Hence the whole adding-machine can be placed on the rod and all of the wheels reset at zero

within less than one revolution of the rod. Therefore both the addition and the resetting are very quick brief operations.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A registering mechanism including a rod, registering-wheels loosely mounted thereon, and a device mounted between said wheels through which one wheel can move the adjacent wheel, said device being positively moved both in and out of engagement with said adjacent wheel.

2. A registering mechanism including a pair of wheels mounted beside each other, one wheel driving the other, a series of stops on the side of the driven wheel, a pawl pivoted between its ends on the driving-wheel, and a stationary cam between the wheels for forcing the pawl into engagement with the stops on the driven wheel during one-tenth of a revolution, and for holding the pawl out of engagement with said stops during the remainder of the revolution thereof.

3. A registering mechanism including a rod, registering-wheels loosely mounted thereon, a cam-plate between each pair of registering-wheels that is splined on the rod and has a lug on and a corresponding recess in its periphery, an escapement-pawl pivoted on the side of one wheel that has a head which at each revolution of the pawl rides up over the lug on the cam-plate and a heel that at the same time enters said recess, and a series of projections on the adjacent registering-wheel that is engaged by the head of the pawl while riding over the lug on the cam-plate whereby the wheel carrying said projections is actuated.

4. A registering mechanism including a rod, registering-wheels loosely mounted thereon, a cam-plate between each pair of registering-wheels that is splined on the rod and has a lug on its periphery, at the side adjacent the wheel to be actuated and a recess in the periphery of the other side of the cam-plate, a pawl pivoted on the side of one wheel that has a heel adapted to enter said recess and a head that is offset on a line to one side of said heel that is adapted to ride upon the lug on the cam-plate at the same time that the heel enters the recess thereof, and a series of projections on the wheel to be actuated that is engaged by the head of the pawl while riding over the lug on the cam-plate whereby the wheel carrying said projections is actuated.

5. A registering mechanism including a rod, registering-wheels loosely mounted thereon with a lug on the periphery of each, a casing surrounding said rod and wheels with a longitudinal slot in one side thereof, and a longitudinally-adjustable notched resetting-bar with the notched portion extending through said slot and which while in one position engages the lugs on the wheels and stops them at zero and in the other position permits the lugs to pass through the notches in said bar.

6. A registering mechanism including a rod capable of rotation, registering-wheels loosely mounted thereon, a device mounted between said wheels through which one wheel can move the adjacent wheel, said device being positively moved both into and out of engagement with said adjacent wheel, lugs on the periphery of said wheels, and a longitudinally-movable resetting-bar that is not rotatable with the wheels and which in one position stops the rotation of the wheels and in another position permits the rotation thereof.

7. A registering mechanism including a rod capable of rotation, registering-wheels loosely mounted thereon, a cam-plate between each pair of registering-wheels that is splined on the rod, means on one wheel that at each revolution thereof is actuated by said cam-plate for moving the adjacent wheel, lugs on the periphery of said wheels, a movable resetting-bar which in one position engages said lugs and in another postion does not, and means for holding said rod from rotation when the resetting-bar is not in position to stop the rotation of the wheels.

8. A registering mechanism including a rod capable of rotation, registering-wheels loosely mounted thereon, a cam-plate between each pair of registering-wheels that is splined on the shaft, means on one wheel that at each revolution thereof is actuated by said cam-plate for moving the adjacent wheel, lugs on the periphery of said wheels, an adjustable resetting-bar which in one position engages said lugs and in another position does not engage them, and means actuated by said resetting-bar that prevents the rotation of said rod when said bar is in engagement with the lugs on the wheels and permits the rotation of said rod when the resetting-bar is in position to stop the rotation of the wheels.

9. A registering mechanism including a rod capable of rotation, registering-wheels loosely mounted thereon, a cam-plate between each pair of registering-wheels that is splined on said rod, means on one wheel that at each revolution thereof is actuated by said cam-plate for moving the adjacent wheel, a lug on the periphery of each of said wheels, a longitudinally-adjustable notched resetting-bar which in one position stops the rotation of the wheels and in another position permits said lugs to pass through the notches in said bar, an arm secured to said bar, a shoulder secured on said rod with one portion adapted to engage the end of said arm to prevent the rotation of said rod when the resetting-bar does not engage the lugs on the registering-wheels and another portion to which said arm may be moved that will permit the rotation of said rod when the resetting-bar is in position to stop the rotation of the wheels.

In witness whereof I have hereunto affixed my signature in the presence of the witnesses herein named.

WILLIAM L. SANDAGE.

Witnesses:
NELLIE ALLEMONG,
V. H. LOCKWOOD.