

M. C. CRAWLEY.
 ADDING MACHINE.
 APPLICATION FILED AUG. 7, 1907.

899,482.

Patented Sept. 22, 1908.

Fig. 1.

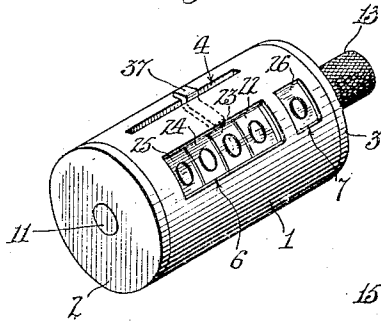
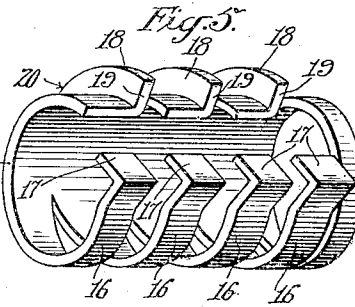


Fig. 2.

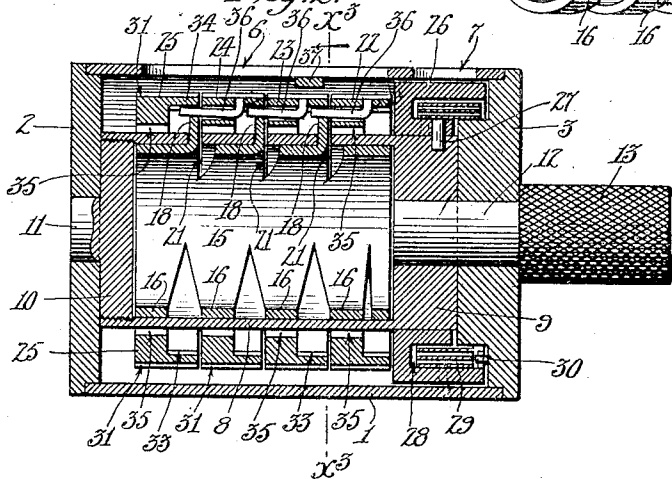


Fig. 3.

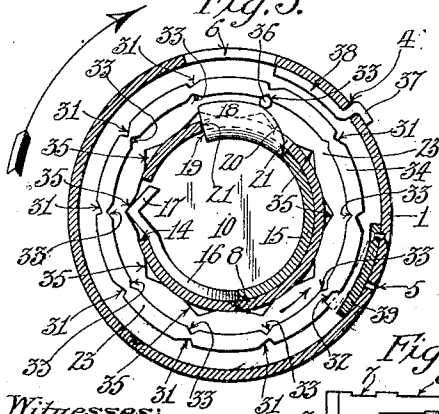


Fig. 4.

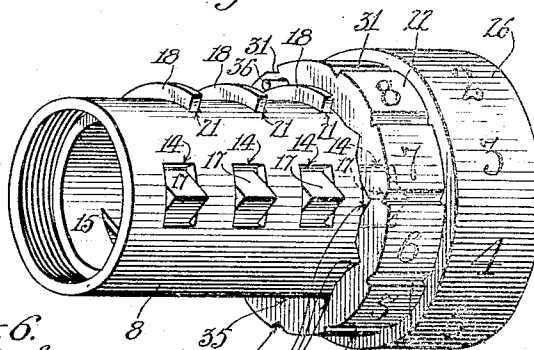
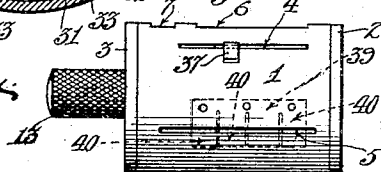


Fig. 6.



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UNITED STATES PATENT OFFICE.

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ADDING-MACHINE.

No. 899,482.

Specification of Letters Patent.

Patented Sept. 22, 1908.

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To all whom it may concern:

Be it known that I, MANSFIELD C. CRAWLEY, a citizen of the United States, residing at Orcutt, county of Santa Barbara, and State of California, have invented a new and useful Adding-Machine, of which the following is a specification.

This invention relates to adding machines and particularly to a portable adding machine which occupies small compass and can be carried in the pocket, and the objects of the invention are to provide an adding machine of this character which is of exceedingly simple and economical construction, which is adapted to be constructed of sheet metal and which is accurate and durable in use.

The accompanying drawings illustrate the invention and referring thereto:—Figure 1 is a perspective view of the invention. Fig. 2 is an enlarged sectional view taken longitudinally through the device. Fig. 3 is a cross section on line x^2-x^3 Fig. 2. Fig. 4 is a perspective view of the shaft, the carrier assembled therein, and one count wheel in place, the other count wheels being removed to reveal the spring fingers and cams of the carrier. Fig. 5 is a perspective view of the carrier in detail. Fig. 6 is a side elevation of the complete device showing the clearing plate in dotted lines and illustrating the column shifter.

The device comprises a barrel 1 having heads 2 and 3, the barrel 1 having longitudinal slots 4 and 5 as shown in Fig. 6, and also having a wide slot 6 and an opening 7, as shown in Fig. 1, which form sight openings through which the numerals of the count wheels and index wheel are exposed to view. A shaft 8 is mounted concentrically in the barrel 1 and comprises a cylindrical shell having at one end a head 9, a head 10 being screwed in the other end of the shell. The head 10 is provided with a short stud 11 which is journaled in the head 2, while a stem 12 is attached to the head 9 and is journaled in the head 3, the stem 12 being provided with a knurled finger piece 13 by which the shaft may readily be revolved by the fingers of one hand, while the main barrel 1 is held stationary with the other hand.

The shaft 8 is provided in the present case with a series of four openings 14 as clearly shown in Fig. 4. Nested within the hollow shaft 8 is a carrier 15 which, as shown in Fig. 5, consists of a shell cut longitudinally and

slitted transversely to form a series of four spring fingers 16, the end of each spring finger having a V-shaped end 17 forming a detent or latch. The carrier is also provided with three cams 18 which are struck up from the metal forming the carrier, as clearly shown in Figs. 2 and 5, each cam 18 having an abrupt face 19 and a curved face 20 as shown in Fig. 3. The shaft 8 is provided with three segmental slots 21 through which the respective cams 18 project, each slot 21, as shown in Fig. 3, being of sufficient length to receive its cam 18.

Mounted on the shaft 8 are four count wheels 22, 23, 24 and 25, each being provided with ten numerals spaced equally apart and which will be presented at the sight opening 6, as the count wheels are rotated forward, as follows: "0, 9, 8, 7, 6, 5, 4, 3, 2, 1". An index wheel 26 is mounted on the head 9 of shaft 8 and is likewise provided with numerals but which will be presented at the sight opening 7 in the following order: "0, 1, 2, 3, 4, 5, 6, 7, 8, 9." The index wheel 26 is fastened to the head 9 by a pin 27 and is formed with an annular recess 28 which receives a helical spring 29, one end of which is attached to the index wheel 26 and the other end is attached to the stationary head 3. Stop pins 30 are provided to prevent the index wheel 26 and shaft 8 from being turned further than one revolution forward in the direction of the arrow Fig. 3 to bring its numeral "9" into the sight opening 7; and the spring 29 serves to return the shaft 8 and index wheel to normal position after each setting of the index wheel 26 so that normally the "0" of the index wheel 26 will appear at the sight opening 7. Each count wheel has an external series of ten notches 31 grooved between the respective numerals, one of which notches is provided with a square shoulder to form a clearing notch 32, clearly seen in Fig. 3. Each count wheel is formed with a flange 34 and ten notches 33 are formed in the inner face of the flange 34. Each count wheel is also provided with a set of ten internal V-shaped notches 35, which latter notches are adapted to coact with the latches 17 of the spring fingers 16.

Three of the count wheels, viz., 22, 23 and 24, are each provided with an L-shaped spring pin 36, termed the carrying pin, which carrying pins are adapted to be locked with the internal notches 33. Each carrying pin normally stands out of engagement with a

notch 33 but may be moved into locked engagement with a notch 33 by a cam 18 as illustrated in Fig. 3.

Slidable in the slot 4 is a column shifter 37 which, as clearly shown in Figs. 1, 3 and 6, consists of a curved blade 38 having an offset portion which extends through the slot 4. By sliding the column shifter 37 into line with either one of the count wheels 22, 23, 24 or 25, and by pressing down with the thumb, the metal of the barrel 1 may be sprung down to cause the end of the blade 38 of the column shifter to engage the notches 31. The blade 38 is designed to restrain a count wheel from being rotated forward but allows the notches 31 to click back as the shaft is returned to its normal position.

A clearing plate 39 is riveted to the inside of the barrel 1, as clearly shown in Figs. 3 and 6, and consists of a slotted plate forming four spring fingers 40 which are respectively adapted to engage with the square shouldered clearing notches 32 of the respective count wheels when the clearing plate 39 is sprung in by pressing in the metal forming the barrel 1 in a manner similar to that in which the column shifter 38 is sprung in. The slot 5 permits of this inward springing action of the metal forming the barrel 1, and it will be seen that when the clearing plate is thus sprung in that it will allow the respective count wheels to rotate backward with shaft 8 until the clearing notch 32 of each count wheel arrives at its associated spring finger 40 of the clearing plate, at which time the spring finger arrests further rearward movement of the count wheels and the normal position of the count wheels is thus secured, all of the count wheels when in such position presenting "0" at the sight opening 6.

In operation the barrel 1 is held in the left hand and the process of addition consists in turning forward the knurled finger piece 13 to successively bring numerals on the index wheel into position at the sight opening 7. After each numeral has been thus turned into the sight opening, the finger piece 13 is released by the fingers and the spring 29 restores the count wheel 26 to zero. Each time that the shaft 8 is turned forward to bring a numeral into the sight opening 7 and is returned by the spring 29, all of the count wheels 22, 23, 24 and 25 are turned forward and back with the shaft 8 by the detents 17 of the spring fingers which engage in the internal notches 35, the spring fingers 17 always turning in both directions with shaft 8 because the barrel 15 is locked therewith by the cams 18. While the numerals are thus being successively turned up at the sight opening 7, the column shifter 37 is held over the count wheel 22 while the first column is being added and although the count wheel 22 turns back with the shaft it is prevented from turning forward by the column shifter and

thus only count wheels 23, 24 and 25 turn both ways with the shaft while count wheel 22 is turned in a backward direction only and keeps up such intermittent backward rotation until disengaged by the column shifter, so that it may make several complete revolutions before the first column of units is run up.

When commencing an operation of addition, the column shifter is placed over count wheel 22 and kept there while running up the units column. After the units column is added, the column shifter is slid over and engaged with the count wheel 23 for the tens, and so on. All of the count wheels being detachably fixed in a certain position to the shaft 8 revolve in both directions therewith as one piece, and the count wheels always turn with the shaft 8 in both directions except when one of them is arrested from forward movement, at which time its relative position on the shaft 8 with respect to the other count wheels will be changed and at the conclusion of the process, before clearing, the respective count wheels on the shaft 8 will still turn as one piece with the shaft 8 whenever the shaft is turned, but their respective positions will have been changed during the process of addition so that the sum of addition will be indicated at the sight openings 6 and 7. The index wheel always turns both ways with the shaft, but has no mechanical function in carrying, serving merely to indicate to the operator how far to turn the shaft each time.

As the shaft is turned forward, for example, to bring the numeral "9" at the sight opening 7, the column shifter 37 is held over the count wheel 22, and as the count wheel 22 is prevented from forward rotation by the column shifter 37, it remains stationary while the shaft rotates within it carrying the count wheels 23, 24 and 25 and the index wheel 26 with it until the numeral "9" of the index wheel 26 appears at the sight opening 7. The latch 17 that is associated with the count wheel 22 clicks into the notches 35 as the latch is carried around with shaft 8. The count wheel 22 now having been held stationary during nine points of revolution of the shaft, will, when the shaft 8 returns to zero, change its position with relation to the sight opening 6 an equal number, i. e., nine points, the blade 38 allowing the notches 31 to click back thereunder. The numeral "9" on the count wheel will now be presented at sight opening 6. Assuming that the next numeral in the units column to be added is "5", the shaft 8 is again turned forward to bring the numeral "5" of the index wheel to the sight opening 7, and as before, all the count wheels turn forward with the shaft except count wheel 22 which as before is held from forward rotation by the column shifter 37. The carrying pin 36 being situ-

ated midway between "9" and "0" on the count wheels, and the cam 18 being situated on the shaft in a position coincident with the "0" on the index wheel, the cam 18 that is associated with count wheel 22 is now (at the beginning of the movement) in conjunction with carrying pin 36 on count wheel 22, forcing it into a notch 33 in count wheel 23 as shown in Fig. 3, thus locking count wheel 23 to count wheel 22. Count wheel 22 being held stationary by column shifter 37, and count wheel 23 being locked to count wheel 22 by the carrying pin 36, the cam 18 is carried forward by the shaft 8 one step, whereupon the cam 18 passes from under the carrying pin 36, and the latter springs out of notch 33 in count wheel 23, thus allowing count wheel 23, after being detained one point, to be carried forward with shaft 8. Since the position of count wheel 22 with relation to shaft 8 has been changed five points, and position of count wheel 23 has been changed one point on the shaft, their positions with respect to the sight opening, on being turned back, will cause count wheel 23 to present "1" and count wheel 22 to present "4" at the sight opening 7. This action is repeated again and again, the count wheel 23 in turn carrying to the count wheel 24, and so on until the first column of figures has been run up and then the column shifter 37 is moved to stand over the count wheel 23 and the same process continues, each count wheel being caused to carry one point to the next higher wheel by means of the associated cam 18 which locks the carrying pin 36 to the next higher count wheel. After all of the columns have been run up in this manner, the sum of the addition is read at the sight opening.

After obtaining the result the machine is cleared and the count wheels restored to zero by turning the index wheel forward to the limit and pressing in the barrel 1 so that the spring fingers 40 of the clearing plate 39 will engage with the count wheels and then turning the index wheel back to zero. The square notches 32 on the count wheels will catch on the spring fingers 40 of the clearing plate 39 and be retained in that position in which position the "0" on each count wheel is shown at the sight opening, after which the pressure against the barrel 1 may be released so that the clearing plate will stand free from the count wheels.

What I claim is:—

1. In an adding machine, a longitudinally fixed, rotatable shaft, a series of shouldered count wheels thereon, yielding means connected with the shaft for engaging with said shoulders and normally locking the wheels upon the shaft so as to be reciprocally rotated therewith, means for restraining the movement of a count wheel to change its relative position upon the shaft, and means

connected with the shaft for causing an adjoining count wheel to be automatically locked with a preceding count wheel when said preceding wheel counts ten points.

2. In an adding machine, a shouldered shaft, a series of count wheels on the shaft detachably engaging the shoulders of said shaft, carrying pins for locking each two adjoining count wheels, and radial cams carried by the shaft for actuating a carrying pin during one step in the revolution of the shaft.

3. In an adding machine, a shaft, a series of count wheels detachably engaging the shaft and having notches, a carrying pin on a count wheel adapted to enter a notch of the adjacent wheel, means for preventing reverse movement of a count wheel, and a cam on the shaft for pressing the carrying pin into a notch during one step in the revolution of the shaft.

4. In an adding machine, a shaft, a series of count wheels thereon each having two sets of internal notches, spring fingers projecting from the shaft and detachably engaging one set of notches, a carrying pin on a count wheel adapted to enter a notch of the other set, and a cam on the shaft for pressing the carrying pin into a notch during one step in the revolution of the shaft.

5. In an adding machine, a shaft, a series of count wheels thereon each having two sets of internal notches, spring fingers projecting from the shaft and detachably engaging one set of notches, a carrying pin on a count wheel adapted to enter a notch of the other set, a cam on the shaft for pressing the carrying pin into a notch during one step in the revolution of the shaft, and means for preventing reverse movement of a count wheel.

6. In an adding machine, a shaft, a series of count wheels thereon each having two sets of internal notches, spring fingers projecting from the shaft and detachably engaging one set of notches, a carrying pin on a count wheel adapted to enter a notch of the other set, a cam on the shaft for pressing the carrying pin into a notch during one step in the revolution of the shaft, the count wheels having external notches, and a column shifter adapted to be shifted over and engaged with a count wheel to prevent reverse movement of the count wheel.

7. In an adding machine, a barrel, a shaft revoluble in the barrel, an index wheel fixed on the shaft, a series of count wheels revoluble on the shaft and having internal notches, spring fingers projecting from the shaft for detachably engaging said notches, cams projecting from the shaft, means actuated by a cam for locking two count wheels together during one step in the revolution of the shaft, and a column shifter slidable along the barrel adapted to be engaged with a count wheel to prevent reverse movement of the count wheel.

8. In an adding machine, a barrel, a shaft revoluble in the barrel, an index wheel fixed on the shaft, a helical spring in the index wheel for returning the shaft and index wheel to normal position, a series of count wheels revoluble on the shaft and having internal notches, spring fingers projecting from the shaft for detachably engaging said notches, cams projecting from the shaft, means actuated by a cam for locking two count wheels together during one step in the revolution of the shaft, and a column shifter slidable along the barrel adapted to be engaged with a count wheel to prevent reverse movement of the count wheel.

9. In an adding machine, a barrel, a shaft revoluble in the barrel, an index wheel fixed on the shaft, means for automatically returning the shaft to normal position, a series of count wheels revoluble on the shaft and having two sets of internal notches, carrying pins mounted on certain count wheels, cams projecting from the shaft, each cam having a path of movement under a carrying pin for moving the carrying pin to lock two adjoining count wheels, and a column shifter slidable along the barrel adapted to be engaged with a count wheel to prevent reverse movement of the count wheel.

10. In an adding machine, a barrel, a hollow shaft revoluble in the barrel, a carrier comprising a shell inside the shaft having a series of cams and a series of spring fingers which extend through openings in the shaft, a series of count wheels revoluble on the shaft and having internal notches which engage with said spring fingers, spring carrying pins carried by certain count wheels, each carrying pin adapted to be sprung by a cam into a notch in an adjacent count wheel, an index wheel fixed on the shaft, a helical spring for returning the shaft to normal position, and a column shifter slidable along the barrel and adapted to engage any count wheel to prevent reverse movement of that count wheel.

11. In an adding machine, a barrel, a hollow shaft revoluble in the barrel, a carrier comprising a shell inside the shaft having a series of cams and a series of spring fingers which extend through openings in the shaft, a series of count wheels revoluble on the shaft and having internal notches which engage with said spring fingers, spring carrying pins carried by certain count wheels, each carrying pin adapted to be sprung by a cam into a notch in an adjacent count wheel, an index wheel fixed on the shaft, a helical spring for returning the shaft to normal position, the barrel having a longitudinal slot, and a column shifter slidable in said slot and comprising a blade adapted to be engaged with external notches of the count wheels by springing in the metal of the barrel adjacent the slot.

12. In an adding machine, a barrel, a hollow shaft revoluble in the barrel, a carrier comprising a shell inside the shaft having a series of cams and a series of spring fingers which extend through openings in the shaft, a series of count wheels revoluble on the shaft and having internal notches which engage with said spring fingers, spring carrying pins carried by certain count wheels, each carrying pin adapted to be sprung by a cam into a notch in an adjacent count wheel, an index wheel fixed on the shaft, a helical spring for returning the shaft to normal position, a column shifter slidable along the barrel and adapted to engage any count wheel to prevent reverse movement of that count wheel, each count wheel having a clearing notch, and a clearing plate attached inside the barrel and having spring fingers adapted to engage the clearing notches only, the barrel being slit adjacent the clearing plate to permit the metal of the barrel to be sprung in to cause the clearing spring fingers to operate.

13. In an adding machine, a barrel, a shaft therein, a series of count wheels on the shaft and having external notches, the barrel having a longitudinal slot, and a column shifter comprising a blade with an offset bend slidably engaging in the slot to permit the column shifter to be placed over any count wheel, the slot in the barrel also permitting the metal of the barrel being pressed in to cause the blade of the column shifter to engage the notches of a count wheel.

14. In an adding machine, a barrel, a shaft therein, a series of count wheels on the shaft and having external notches, the barrel having a longitudinal slot, a column shifter comprising a blade with an offset bend slidably engaging in the slot to permit the column shifter to be placed over any count wheel, the slot in the barrel also permitting the metal of the barrel being pressed in to cause the blade of the column shifter to engage the notches of a count wheel, one of said notches in each count wheel having an abrupt shoulder forming a clearing notch, and a clearing plate attached inside the barrel and formed with spring fingers, the barrel having a slit along the clearing plate to enable the metal of the barrel being pressed in to cause the clearing fingers to engage with the clearing notches.

15. In an adding machine, a barrel having heads, a hollow shaft having heads, a stud on one of the latter heads journaled in a head of the barrel, a stem on the other shaft head journaled in the other head of the barrel and projecting therefrom, a series of count wheels revoluble on the shaft, an index wheel fixed on the shaft, the barrel having an elongated sight opening to expose the count wheels and a sight opening to expose the index wheel, a stop to prevent more than a complete revolution of the shaft, the index wheel having an annular groove, a helical spring in the

groove with one end attached to the barrel
and the other end to the shaft for returning
the shaft, means for restraining movement of
a count wheel to change its relative position
5 with the shaft, and means for temporarily
automatically locking another count wheel
with the first named count wheel.

In testimony whereof, I have hereunto set
my hand at Santa Maria California this 30th
day of July 1907.

MANSFIELD C. CRAWLEY.

In presence of—

F. D. HALL,

JOSEPH ROEMER.