A. F. POOLE.

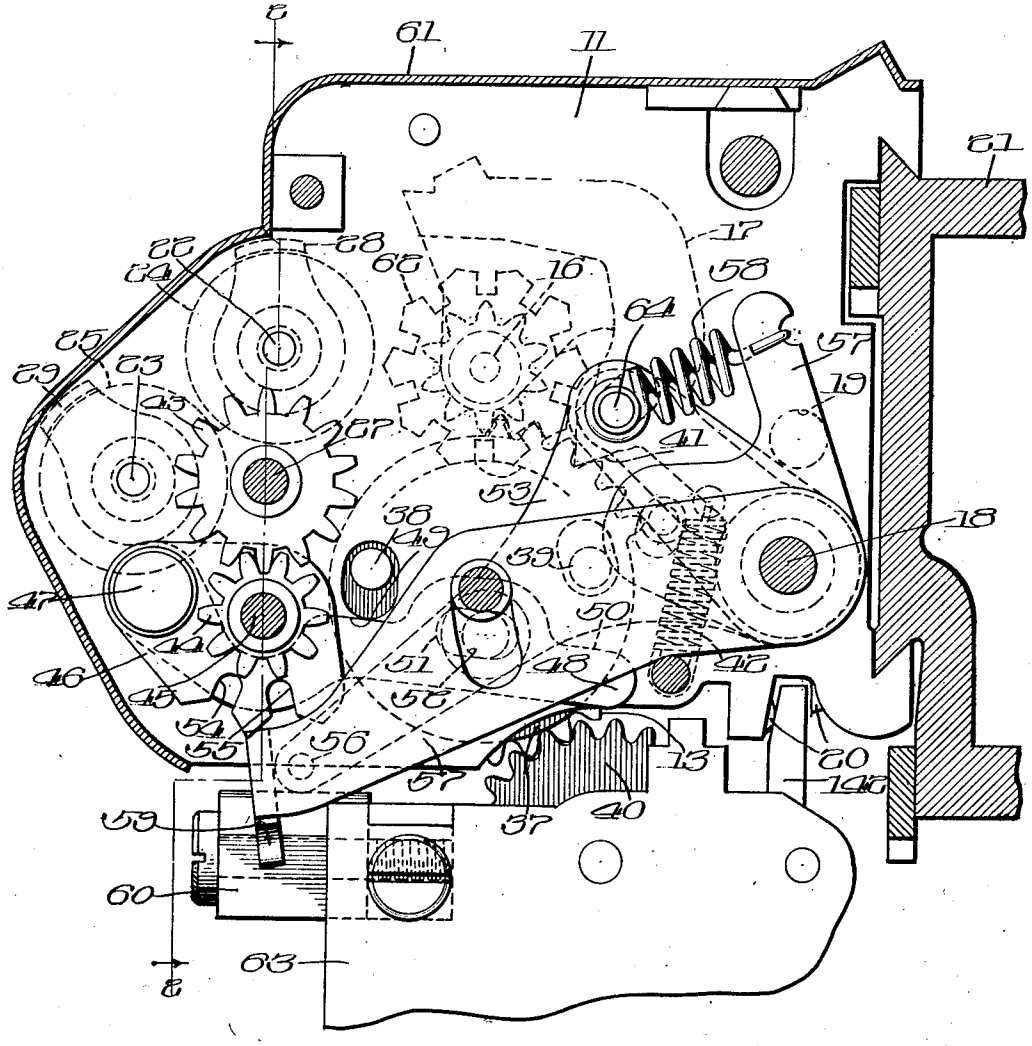
CALCULATING MACHINE.

APPLICATION FILED JULY 21, 1913.

1,374,762. **Patented Apr. 12, 1921.**

5 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
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CALCULATING MACHINE.

APPLICATION FILED JULY 21, 1913.

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5 SHEETS—SHEET 2.

Fig. 2.

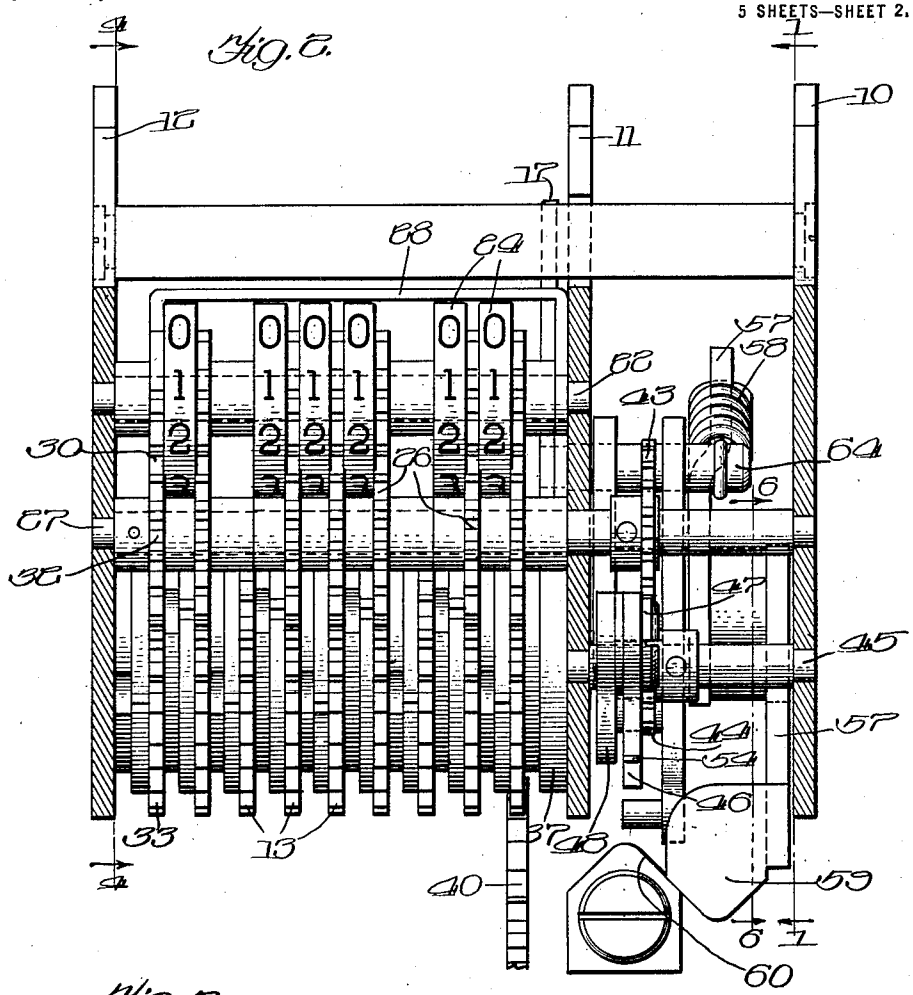
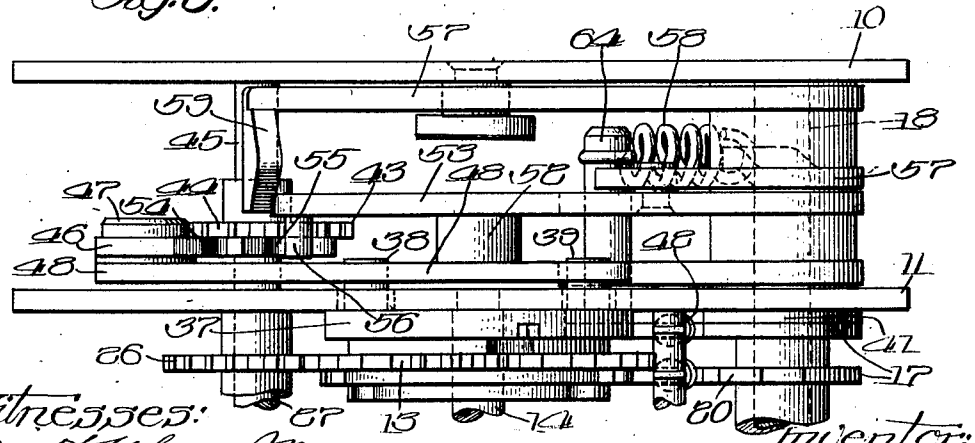


Fig. 3.



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CALCULATING MACHINE.

APPLICATION FILED JULY 21, 1913.

1,374,762.

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5 SHEETS—SHEET 3.

Fig. 4.

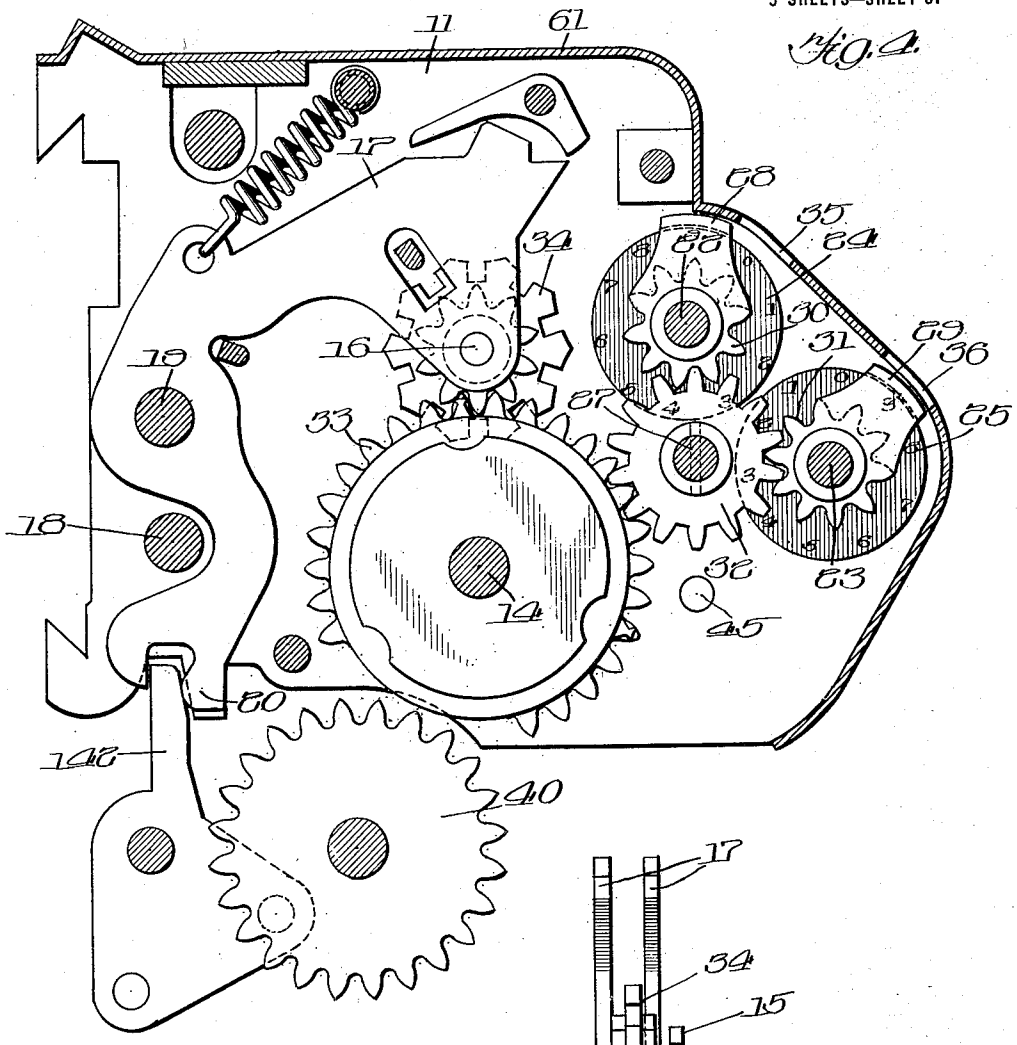
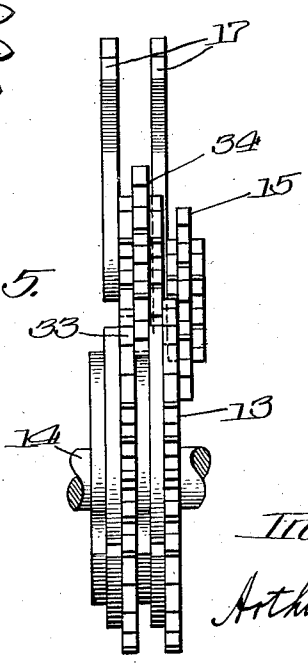


Fig. 5.



Witnesses:

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CALCULATING MACHINE.

APPLICATION FILED JULY 21, 1913.

1,374,762. Patented Apr. 12, 1921.

5 SHEETS—SHEET 4.

Fig. 6.

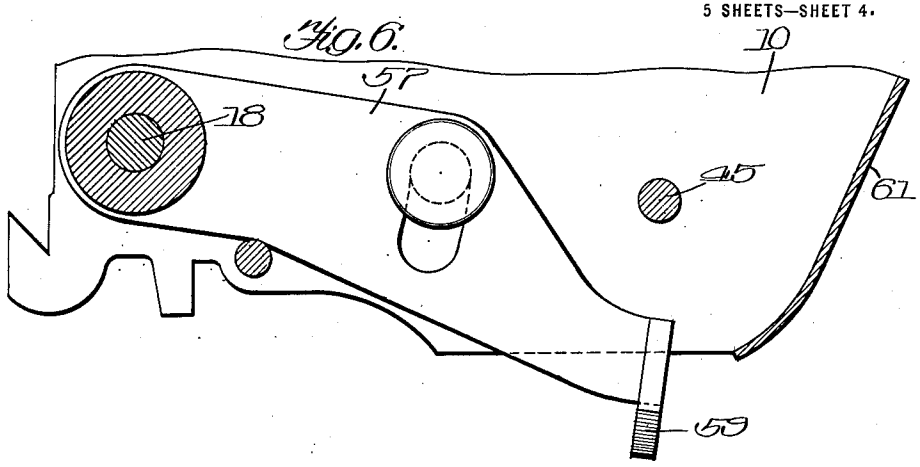


Fig. 7.

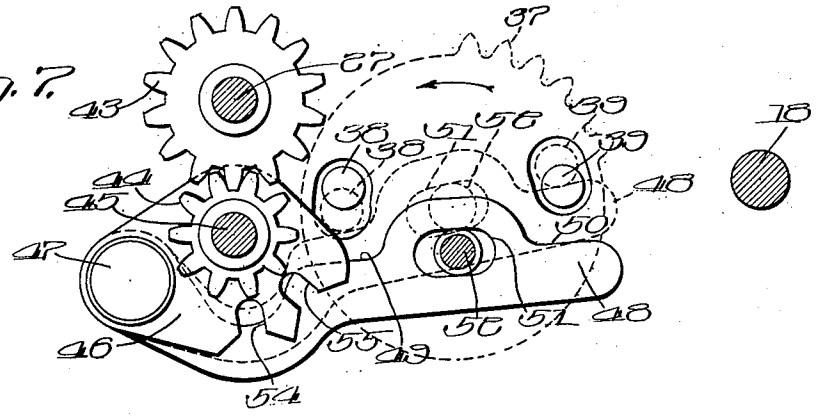
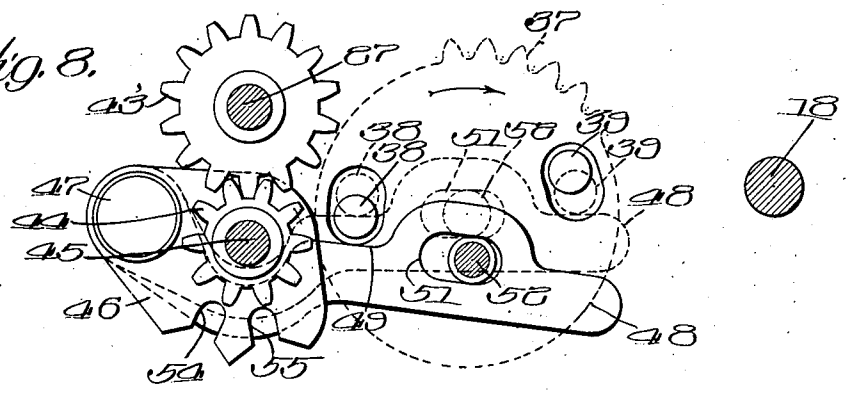


Fig. 8.



Witnesses:

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CALCULATING MACHINE.

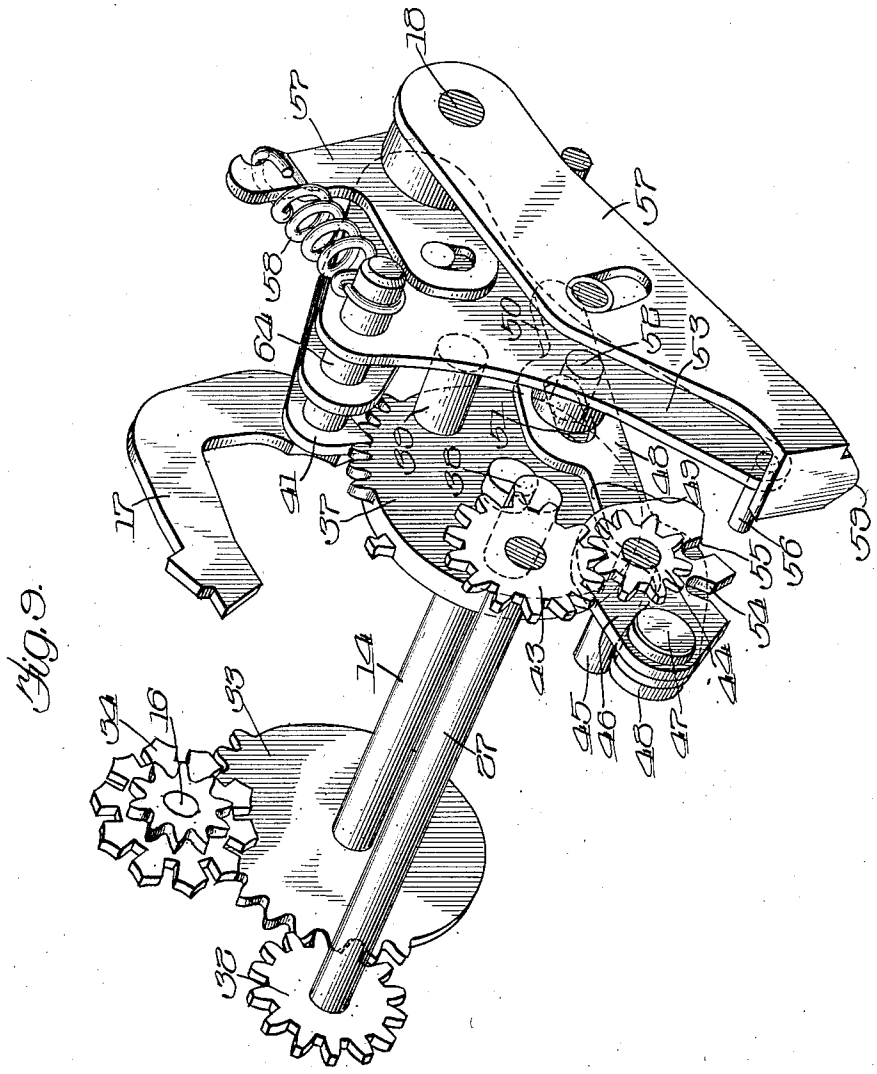
APPLICATION FILED JULY 21, 1913.

1,374,762.

Patented Apr. 12, 1921.

5 SHEETS—SHEET 5.

Fig. 9.



Witnesses:

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Inventor:

Arthur F. Poole

UNITED STATES PATENT OFFICE.

ARTHUR F. POOLE, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO REMINGTON ACCOUNTING MACHINE CORPORATION, OF NEW YORK, N. Y A CORPORATION OF NEW YORK.

CALCULATING-MACHINE.

1,374,762. Specification of Letters Patent. **Patented Apr. 12, 1921.**

Application filed July 21, 1913. Serial No. 780,408.

To all whom it may concern:

Be it known that I, ARTHUR F. POOLE, of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Calculating-Machines, of which the following is a specification.

My invention is an improvement in algebraic totalizers for use in calculating machines.

One of the objects of my invention is the provision of a totalizer with but a single set of carrying mechanism from which the accurate total of a series of items, whether the same be positive or negative, which total I will hereafter call an algebraic total, may be read.

Another object of my invention is the provision of a totalizer showing the algebraic total on either one or the other of two sets of figures and having an automatic means to designate which set of figures shall be read.

Another object of my invention is the provision of a totalizer having a single set of reversible carrying gears and two sets of figures paired 0—9 associated therewith, automatically operated means designating which set of figures shall be read and means automatically inserting a unit in the totalizer after the last digit of the number inserted has been entered.

A further object of my invention is the provision of an algebraic totalizer in which the digits of a number may be inserted *seriatim* and especially adapted to operate in conjunction with calculating machines of the type described in Patent Number 893,718, issued to John C. Wahl, July 21, 1908.

A further object of my invention is the provision of an algebraic totalizer which is simple in construction, positive in action and easy to manufacture.

These and other objects of my invention are described in the accompanying specification, in the drawings of which—

Figure 1 is a section on the line 1—1 of Fig. 2.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is a bottom view of mechanism in the right side of Fig. 2.

Fig. 4 is a section on line 4—4 of Fig. 2.

Fig. 5 is an elevation showing the arrangement of the carrying and carryable gears.

Fig. 6 is a section on line 6—6 of Fig. 2.

Figs. 7 and 8 are details of the units adding mechanism.

Fig. 9 is a perspective view.

As above stated, my invention is particularly designed to be used in connection with the calculating machine described in the aforementioned patent. Reference thereto will show a totalizer mounted on a typewriter carriage, a set of numeral keys, any one of which serves to operate a master wheel and master dog numbered 40 and 142, respectively, therein, also that the operating of any numeral key results in the master wheel 40 and the master dog 142 moving in the following sequence:

(*a*) Dog 142 moves in a counter-clockwise direction (Fig. 1), thus unlocking the chain of the totalizer gears at the actuated gear.

(*b*) The master wheel rotates an amount depending on the key actuated.

(*c*) The dog returns to its original position.

(*d*) The carriage escapes, bringing the totalizer wheel of the next lower order into engagement with the master wheel. A reversing handle is also provided whereby the direction of motion of the master wheel consequent upon the actuating of any key will be determined and thus numbers inserted in the machine either additively or subtractively.

Since the mechanism for producing these motions is very thoroughly described in the patent referred to, I shall not now enter into a further description of such mechanism, but shall premise that the actuating of a typewriter numeral key results in the master wheel, master dog and carriage moving in the sequence recited above. The master wheel numbered 40 and the master dog 142 in my present application correspond in position and function to the master wheel and master dog bearing the same numbers in the cited patent of Wahl referred to above.

The mechanism constituting the totalizer of my present invention is suitably supported between three plates 10, 11 and 12. The plates 11 and 12 serve for the support of totalizing mechanism similar

in construction to that shown in the totalizer of the above mentioned Wahl patent. This consists of a set of carrying gears 13 (Figs. 2, 3 and 5) loosely mounted on a shaft 14 rigid between the plates 11 and 12 and which are adapted to coöperate *seriatim* with the master wheel 40 rotatably mounted in the framework 63. A set of carryable gears 15 (Fig. 5) are pivoted at 16 on a set of swinging arms 17. These arms are loosely mounted on shafts 18 and 19 and their associated carryable gears 15 serve to connect the carrying wheels 13. Arms 17 have heels 20 adapted to be engaged *seriatim* by the master dog 142. The carrying gears 13 are provided with the usual carrying teeth which coöperate with the carryable gears 15 and thus transfer the tens at the proper time. The chain of gearing composed of the carrying gears 13 and the carryable gears 15 is normally locked. In order for the master wheel to operate on a carrying gear at the middle of the chain the master dog 142 acts on a swinging arm 17, thereby raising the carryable gear 15 mounted thereon out of mesh with the carrying gears 13 to the right and left, thus unlocking the actuated carrying gear 13 from the next one to the right.

The totalizer is mounted on a truck 21 moving with the typewriter carriage. Numbers are inserted in the totalizer by the master wheel one digit at a time, beginning with the digit in the highest place and ending with the digit in the units place. During the insertion of a number the typewriter carriage escapes step by step to the left after the insertion of each digit, thus bringing successive carrying gears 13 into mesh with the master wheel 40 and successive swinging arms 17 in a position to be acted on by the master dog 142.

The foregoing will be recognized as substantially the operation and structure of the totalizer in the above stated Wahl patent. The parts which are peculiar to my present invention are those which have to do with the indicating of positive and negative totals. The function of these parts and the parts themselves will now be described.

It is well known that when a totalizer having a single set of reversible carrying mechanism is provided with two sets of figures whereby algebraic totals may be read and further that when these figures are paired in the relation of 0—9 8—1, et cetera, an extra unit must be added to the set of figures to be read each time the totalizer passes through zero in either direction. For instance, assuming that a positive total is exhibited by one set of figures and that a greater number than the exhibited number is subtracted, the set of figures which heretofore had been exhibiting the positive total would now change to a number preceded by a series of 9's, which number would be the correct arithmetical complement of the negative total. A number preceded by a series of 0's would be exhibited by the set of figures from which the negative total is read but this latter number, owing to the wheels being paired in the relation of 9—0 would be one unit less than the correct amount. I have, therefore, provided, in addition to two sets of figures and a shutter mechanism shifting to exhibit one or the other of these sets, mechanism brought into operation after the insertion of a number to insert an additional unit in the totalizer in case the number just inserted has caused the totalizer to pass through zero. I shall first describe the shutter mechanism.

Loosely mounted on two shafts 22 and 23, which shafts are rigid in the side plates 11 and 12, are the two sets of number wheels 24 and 25. These number wheels 24 and 25 have their figures arranged to progress in opposite directions and the figures are so arranged that positive totals will be read on the number wheels 24 and negative totals will be read on the number wheels 25. A set of idlers 26 loosely mounted on shaft 27 rotatably mounted in the side plates 10, 11 and 12 (Fig. 2) communicates the motion of the carrying gears 13 to the number wheels (Figs. 1 and 4). Loosely mounted on the shafts 22 and 23 are two shutters 28 and 29 for the positive and negative number wheels respectively. These shutters 28 and 29 are in the form of bails (best shown in Fig. 2) and the left ends of these bails are formed into gear teeth 30 and 31 which mesh with an idle wheel 32 rigidly attached to the shaft 27. A special carrying gear 33 rotatably mounted on the shaft 14 is in mesh with the idler 32 and this gear 33 is connected by a carryable gear 34 to the carrying gear 13 in the highest decimal place of the totalizer. The carryable gear 34 is exactly like the carrying gears 15. A carryable tooth on the next carrying gear 13 to the right of the gear 33 (Fig. 5) serves to actuate the gear 34 whenever the totalizer passes through zero. A spur gear forming a part of the gear 34 is in engagement with the gear 33 and turns it whenever the gear 34 is turned by the gear 13 adjacent to the right. Exactly like the gear 15, the gear 34 also has a star portion coöperating with a locking disk and passing scallop on the said gear 13 adjacent to the right. The gear 33 has some of its teeth cut away, as shown in Fig. 4, so as to avoid interference with the master wheel. Whenever the totalizer passes through zero the carrying wheel 13 in the highest decimal place, of course, moves. This motion is transmitted by means of the carryable gear 34 to the gear 33 and by it through the idler 32 to the shutters 29 and 28.

The shutters 29 and 28 register with suitable windows 35 and 36 in a cover 61 to thus conceal one or the other of the sets of number wheels 24 and 25. When the shutters are in the position shown in Fig. 4 the figures on the positive set of wheels are exhibited, and when the shutters are moved to their alternate position by means of the totalizer passing through zero the shutter 28 will move in front of the window 35 and the shutter 29 will move away from the window 36, thus exposing the numbers on the negative set of number wheels.

From the foregoing it will be obvious that whenever the totalizer passes through zero the position of the shutters will be changed and thus expose the total on the wheels 24 or 25 according as said total is positive or negative, but, as previously stated, such a total is wrong by one. I shall now describe the mechanism for inserting this unit in the last decimal place of the totalizer subsequent to the insertion of the number which caused the totalizer to pass through zero.

Referring to Figs. 1 and 2, it will be noticed that to the right of the carrying wheel 13 in the last decimal place of the totalizer is a segmental gear 37, which is rotatably mounted on the shaft 14. Rigid in this segmental gear 37 are two pins 38 and 39 which project through suitable openings in the side plate 11. A carryable gear 62, which is mounted on a swinging arm 17 and is similar to the other carryable gears 15 previously referred to, connects this segmental gear with the carrying wheel 13 in the units place of the totalizer. A dog 41 rotatably mounted on the shaft 18 and held in engagement with the segmental gear 37 by a spring 42 serves to lock the segmental gear in place. It will now be seen that any rotation of the segmental gear 37 will be transmitted through the carryable gear 62 to the carrying wheel 13 in the units place of the totalizer. A gear 43 is rigid with the shaft 27. It will be remembered that this shaft is moved every time the totalizer passes through zero. The gear 43 engages a gear 44 rigid on a shaft 45 which is pivoted between the plates 10 and 11. Rigid on the same shaft is the arm 46 having pivoted on it at 47 a cam 48. This cam has two surfaces 49 and 50 adapted to contact with the pins 38 and 39 and also a slot 51 in which moves a pin 52 rigidly mounted in a lever 53 rotatably mounted on the shaft 18. The arm 46 has two locking slots 54 and 55 which are engaged by a pin 56 rigidly mounted in the arm 53 when the latter is raised. A lever 57 is also rotatably mounted on the shaft 18 and is connected to the arm 53 by a spring 58. The left end of this lever (Fig. 1) terminates in a cam surface 59 which is adapted to engage a cam surface 60 rigid on the actuator framing 63 subsequently to the insertion by the master wheel of the last digit of a number.

It will be remembered that when a number is inserted in the totalizer the highest digit is entered first and the totalizer travels step by step to the left, the master wheel coöperating with successive carrying gears as the number is inserted digit by digit until the last digit is inserted and then the totalizer may continue its travel to the left for some little distance. After the insertion of every number the cam 60 raises the lever 57 by means of the cam 59 during such extra travel and this motion of the lever 57 will insert a digit in the totalizer if the number which has just been inserted has caused the totalizer to pass through zero. The reason of this is that when the lever 57 is raised the spring 58 raises the lever 53 to a position where the pin 52 is collinear with the shaft 14, thus contacting the cam surfaces 49 and 50 with the pins 38 and 39. It will be remembered that whenever the totalizer passes through zero the pivot 47 will change from the position shown in Fig. 7 to that shown in Fig. 8 or vice versa. Now, assuming the pivot 47 is in the position shown in Fig. 7, the pins 38 and 39 in the position shown in full lines in the same figure and the cam 48 is raised by the pin 52 until 52 is concentric with the shaft 14, it is obvious that the pins 38 and 39 will move into their dotted positions and the segmental gear 37 in which said pins are mounted will be turned in the direction of the arrow. If the pivot 47 is in the position shown in Fig. 8 and the pins 38 and 39 are in their full line position and the cam 48 be raised the pins 38 and 39 will be thrown in their dotted position and the segmental gear 37, to which they are attached, will be rotated in the reverse direction. Now, the position of the pivot 47 shown in Fig. 8 is the position corresponding to the exhibition of the positive total, and since the arm 46, on which the pivot 47 is mounted, is geared to the shutters and therefore moved coincidently, the position of the pivot 47 shown in Fig. 8 will correspond to the exhibition of a positive total, and the position of the pivot 47 shown in Fig. 7 will correspond to the exhibition of a negative total. The parts are so proportioned that when the raising of the cam 48 rotates the pins 38 and 39 either in the direction as shown in Fig. 7 or the direction as shown in Fig. 8 the amount of this rotation will correspond to the insertion of one unit. The direction of insertion of this unit depends upon the position of the pivot 47 which in turn depends upon the position of the shutters. Whether the unit is inserted at all depends on whether the pivot 47 has been changed since the last time the lever has been raised or since the last num-

ber has been inserted in the totalizer. The lever 57 is, of course, raised by means of the cam 59 every time a number is inserted in the totalizer but this raising will not affect the segmental gear 37 unless the position of the pivot 47 has been changed between times or unless the number just inserted has caused the totalizer to pass through zero.

A pin 64 rigid in the lever 53 connects this lever to the dog 41, thereby raising the dog out of engagement with the teeth of the segmental gear 37 each time the lever 57 is raised. The spring 58 connecting the lever 53 with the lever 57 is provided to allow some extra motion to the cam 59 beyond that required to bring the lever 53 into the proper position, thus compensating for any variation of distance between the totalizer and the actuator.

It will be seen that I have provided a simple mechanism for giving an algebraic total. While it is true that the totalizer may pass through zero during the insertion of a number and temporarily exhibit a total which is wrong by one, this objection is not material since as soon as the end of the number being inserted has been reached the exhibited total will be corrected by the extra travel of the totalizer.

Attention is called to the action of the pin 56 on the locking slots 54 and 55. Besides locking the gear chain against motion while the extra unit is inserted, this action removes whatever spiral may be in the chain before the unit is inserted. Inspection of Figs. 1, 2 and 9 will show that the parts are so proportioned that on the lever 57 being raised by cam 59 contacting with the cam surface 60 on the framework, the pin 56 will have entered the inclined portion of either the slot 54 or the slot 55 before the cam 48 engages the pins 38 and 39. The parts are so proportioned that when the cam 48 has been raised far enough to engage the pins 38 or 39 the pin 56 will have entered the dead portion of the slot 54 or 55. Thus, whatever spiral exists in the totalizer will have been removed before the action of the cam 48 on the pins 38 and 39 inserts an extra unit. It is well known that in a totalizer having the carrying simultaneous with the actuation, as for example the Wahl totalizer shown in this present application, it is impossible to make the action of the carrying gears on the carryable gears such that when the first gear of a chain of five to ten gears is moved, the last gear will move the same amount as the first, owing to the necessary lost motion in the chain. In any algebraic totalizer in which the carrying is simultaneous with the actuation this spiral effect interferences with the subsequent insertion of a unit in the last place, for whether or not a unit is inserted is determined by the position of the highest gear in the chain and if this highest gear is not in its proper position, the totalizer will not act properly. In the device shown in the present application I remove all the spiral by the action of the pin 56 on the locking slots 54 and 55 before inserting the extra units, and I wish to claim the same broadly.

While I have shown my invention employing two sets of number wheels it is obvious that this is not at all necessary since one set of number wheels could be provided having two oppositely running sets of figures paired 0—9, and a single shutter could be used to shift from one set of figures to the other. The particular reason why two sets of number wheels were used in this present construction instead of one was from considerations of space only, since in the Wahl machine the distance of one carrying gear 13 to the next is one-tenth of an inch, thereby conforming to the ordinary typewriter pitch, and there would not be space enough to employ a number wheel with two sets of figures on it without making those figures undesirably small. Moreover, I consider such a construction an obvious equivalent of my invention.

I believe I am the first to show a ten key adding and subtracting machine equipped with an algebraic totalizer, which totalizer is automatically corrected subsequently to the insertion of the last digit of a number of greater absolute value than and opposite sign to the previously exhibited total, and I wish to claim the same broadly.

When I speak of a 10 key adding machine I mean a machine having a decimal carriage on which the digits are set up *seriatim*, as distinguished from an 81 key machine having no decimal carriage and in which the numbers are first set up by the keys and then entered in all the decimal places of the totalizer simultaneously. Obviously, a 10 key adding machine may either have the numbers entered simultaneously with the action of the key, as in the Wahl machine, or may have the action of the key simply set up the number on the decimal carriage and afterward transfer the set up number into the totalizer, as is done in the Dalton machine. Another distinction between 10 key and 81 key machines is that in the 10 key machine any key may operate in any decimal place of the totalizer, whereas in the 81 key machine any key may operate in but one decimal place of the totalizer. According to these definitions a machine which has more than 10 keys, such, for instance, as the machine of Goldberg as disclosed in Patent Number 893,720, July 21, 1908, which shows 11 keys, would really be in the class of 10 key adding machines, since this Goldberg machine has a decimal carriage and any one of the 11 keys may operate in any decimal

place of the totalizer. In the claims which follow, when I speak of an adding machine having 10 keys I intend to cover a machine which is in the general class of 10 key adding machines, as defined above, even though such a machine may have a greater or lesser number of keys than 10, the essential feature being that any of the keys may be used in any decimal place of the totalizer.

Many other changes in the precise construction herein disclosed may be made by those skilled in the art without departing from the spirit of my invention, since

I claim:

1. In a calculating machine, the combination of a master wheel, a set of numeral keys, each adapted to operate a master wheel an amount corresponding to the value of said key, a reversible totalizer adapted to have numbers inserted therein by said master wheel, the arrangement of the keys, totalizer and master wheel being such that any of the said keys may determine the number entered by said master wheel in any of the decimal places of said totalizer, and means to automatically insert a unit in said totalizer subsequent to the insertion of a number therein by said keys.

2. In a calculating machine the combination of a totalizer, totalizer actuating mechanism, a set of numeral keys operative on said totalizer actuating mechanism thereby to enter numbers in said totalizer, the arrangement of totalizer, totalizer actuating mechanism and keys being such that any of said keys may determine the number to be entered by said actuating mechanism into any of the decimal places of said totalizer, and means adapted to insert automatically a unit in said totalizer subsequent to the insertion of a number by said totalizer actuating mechanism whenever said insertion causes said totalizer to pass through zero.

3. In a calculating machine, the combination of a master wheel, a set of numeral keys, each adapted to operate a master wheel an amount corresponding to the value of said key, a totalizer adapted to have numbers inserted therein by said master wheel, the arrangement of the keys, totalizer and master wheel being such that any of the said keys may determine the number entered by said master wheel in any of the decimal places of said totalizer, means to automatically insert a unit in said totalizer subsequent to the insertion of a number therein by said keys, and means under control of the highest wheel of said totalizer to determine when said unit inserting means shall be operated.

4. In a calculating machine the combination of a totalizer actuating mechanism, a totalizer adapted to have numbers inserted therein by said totalizer actuating mechanism, a set of numeral keys, each adapted to operate said totalizer actuating mechanism an amount corresponding to the value of said key, a reversible carrying mechanism connecting the elements of said totalizer, the arrangement of keys, totalizer and totalizer actuating mechanism being such that any of said keys may determine the number entered by said totalizer actuating mechanism into any of the decimal places, means to determine whether said number shall be entered into said totalizer in addition or in subtraction and means to automatically insert a unit into said totalizer subsequent to the insertion of a number therein by said totalizer actuating mechanism.

5. In a calculating machine the combination of a totalizer, totalizer actuating mechanism, a set of numeral keys each adapted to operate said totalizer actuating mechanism an amount corresponding to the value of said key, the arrangement of totalizer, totalizer actuating mechanism and keys being such that any of said keys may determine that the number represented by said key shall be entered by the totalizer actuating mechanism into any of the decimal places of said totalizer, means to cause a relative motion between said totalizer and said totalizer actuating mechanism and means to insert, automatically a unit in said totalizer subsequent to the insertion of a number by said totalizer actuating mechanism said unit being inserted only when said inserted number causes said totalizer to pass through zero.

6. In a recording calculating machine the combination of, a traveling carriage, a master wheel, an escapement for said carriage, a set of ten numeral keys each adapted to operate said master wheel an amount corresponding to the value of said key and subsequently actuate said escapement, a totalizer mounted on said carriage and operated by said master wheel, and means brought into operation by the travel of said carriage adapted to insert automatically a unit in said totalizer subsequently to the insertion of a number by said master wheel whenever said totalizer passes through zero.

7. In a calculating machine, the combination of a totalizer, a set of numeral keys adapted to insert numbers therein, a decimal carriage movable step by step from one decimal position to another, and means whereby an additional step of said carriage beyond the last decimal position of the totalizer may insert a number in said totalizer.

8. In a calculating machine, the combination of a totalizer, a set of numeral keys adapted to insert numbers therein in one direction for addition and in the reverse direction for subtraction, a decimal carriage movable step by step from one decimal position to another, and means whereby an

additional step of said carriage beyond the last decimal position of the totalizer may insert a number in said totalizer in the same direction as that in which the last preceding number was inserted.

9. In a totalizer a movable pivot and means adapted to actuate the wheels of said totalizer mounted on said pivot.

10. In a totalizer a movable pivot whose position is determined by the highest wheel of the said totalizer and means adapted to actuate the wheels of said totalizer mounted on said pivot.

11. In a totalizer a movable pivot whose position is determined by the highest wheel of said totalizer and means adapted to actuate the wheels of said totalizer in either direction mounted on said pivot.

12. In a calculating machine, the combination of a totalizer containing a set of wheels, a movable pivot operatively connected with said totalizer and adapted to occupy either of two positions corresponding to two positions of one of the wheels of the totalizer, a bar mounted on said pivot, a second totalizer wheel, a pair of pins projecting from said wheel and means to bring said bar in contact with one or the other of said pins, according to the position of said movable pivot.

13. In a totalizer, the combination of a set of wheels, a movable pivot whose position is governed by one of said totalizer wheels, a bar mounted on said pivot, a second totalizer wheel, a pair of pins projecting from said second wheel into the plane of said bar, and means to bring said bar in contact with one or the other of said pins, according to the position of said movable pivot.

14. In a totalizer a movable pivot whose position is determined by the highest wheel in the totalizer and means adapted to add a unit in said totalizer mounted on said pivot.

15. In a totalizer a movable pivot whose position is determined by the highest wheel in the totalizer and means adapted to add a unit in said totalizer in either direction mounted on said pivot.

16. In a calculating machine the combination of a totalizer, a master wheel, a decimal carriage, means to cause a relative motion of said totalizer and master wheel, a set of keys adapted to actuate said master wheel and determine a step by step motion of said decimal carriage, the arrangement of keys, master wheel and totalizer being such that any of said keys may determine that the number represented by said key may be entered in any decimal place of said totalizer and means to insert a unit in said totalizer independent of the operation of said keys.

17. In a calculating machine the combination of a totalizer, a master wheel, a decimal carriage, means adapted to cause relative motion of said totalizer and master wheel, a set of keys adapted to actuate said master wheel and determine a step by step motion of said decimal carriage, and means controlled by the motion of said decimal carriage to add a unit in said totalizer independent of the operation of said keys.

18. In a calculating machine, the combination of a totalizer, a set of numeral keys adapted to insert numbers therein, a decimal carriage movable step by step from one denominational position to another, and means including a cam and follower mechanism brought into coöperation by an additional step of the carriage beyond the last decimal position of the totalizer to insert a number in said totalizer.

19. In a calculating machine, the combination of a decimal carriage, a totalizer, a cam on said decimal carriage, and means brought into operation by said cam to add a unit in said totalizer.

20. In a totalizer, the combination of a lever mounted on a movable center, a totalizer wheel having teeth thereon, and means including said lever to actuate said totalizer wheels independent of said teeth in a direction determined by the position of said movable center.

21. In a totalizer the combination of a lever mounted on a movable center, means to change the position of said movable center coincident with the passage of said totalizer through zero, and means to actuate the wheels of said totalizer in a direction determined by the position of said movable center.

22. In a calculating machine the combination of a decimal carriage, a totalizer, a lever mounted on a movable center, means to change the position of said center coincident with the passage of said totalizer through zero and means operated by the decimal carriage to operate said lever and thereby insert a unit in said totalizer in a direction determined by the position of said movable center.

23. In a calculating machine the combination of a decimal carriage, a totalizer embodying a set of carrying wheels rotatable about a center, a movable pivot whose position is determined by the highest wheel of said totalizer, a lever mounted on said movable pivot and adapted to advance said totalizer wheels one step in either direction, a second lever, a pin and slot connection between said first lever and said second lever, and means operated by the motion of the decimal carriage to bring said pin and slot connection in line with the center of said totalizer wheels.

24. In a calculating machine, the combination of a totalizer, said totalizer including a set of carrying gears and a set of carryable gears, means for the insertion of a unit in said totalizer as an incident of the passing of the highest carrying gear through 0, and means to remove the spiral consequent upon the passing of said highest carrying gear through 0 before the insertion of said unit.

25. In a calculating machine, the combination of totalizer actuating mechanism, a set of numeral keys, each adapted to operate said totalizer actuating mechanism an amount corresponding to the value of said key, a totalizer adapted to have numbers inserted therein by said totalizer actuating mechanism, the arrangement of the keys, totalizer and totalizer actuating mechanism being such that anv of the said keys may determine the number entered by said totalizer actuating mechanism in any of the decimal places of said totalizer, means to automatically insert a unit in said totalizer subsequent to the insertion of a number therein by said keys, and means under control of the highest wheel of said totalizer to determine when said unit inserting means shall be operated.

26. In a totalizer the combination of a totalizer wheel having teeth, an actuating means adapted to turn said wheel by means of said teeth, a lever mounted on a movable center and means to actuate said totalizer wheel upon the operation of said lever and in the direction determined by the said movable center.

27. In a calculating machine, the combination of a totalizer, totalizer actuating mechanism, a set of numeral keys operative on said totalizer actuating mechanism to enter numbers thereby in said totalizer, the arrangement of totalizer, actuating mechanism and keys being such that any of said keys may determine the number to be entered by said actuating mechanism into any of the decimal places of said totalizer, and means adapted to insert automatically a unit in said totalizer subsequent to the insertion of a number by said totalizer actuating mechanism, and means controlled by the position of the highest wheel of said totalizer to determine when said unit-inserting means shall act.

28. In a calculating machine, the combination of a totalizer comprising a series of denominational wheels and means for transferring from one of said wheels to another, an actuator for said totalizer, a decimal carriage movable step by step to bring one of said wheels after another into coöperation with said actuator, a toothed device connected with the wheel of highest order, and a device moved radially into engagement with said toothed device by an additional step of said carriage beyond the last decimal position of the totalizer to bring said toothed device and said highest wheel to correct position.

29. In a calculating machine, the combination of an algebraic totalizer comprising a series of wheels, an actuator, a decimal carriage for bringing said totalizer wheels one after another into coöperation with said actuator, means for carrying the tens from one of said wheels to another, a device movable to one position when the totalizer passes through zero in a positive direction and to a second position when said totalizer passes through zero in a negative direction, and a delayed action device acting first to true up said two-position device and then to insert the necessary number in the totalizer.

In witness whereof I have hereunto signed my name, this 16th day of July, 1913.

ARTHUR F. POOLE.

Witnesses:

D. W. Gall,

E. P. Bitzer.