

May 23, 1933.

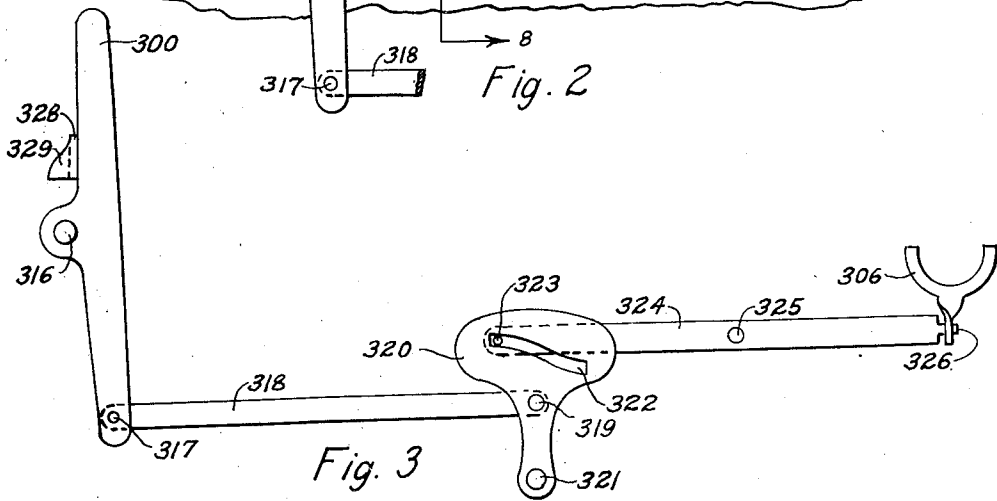
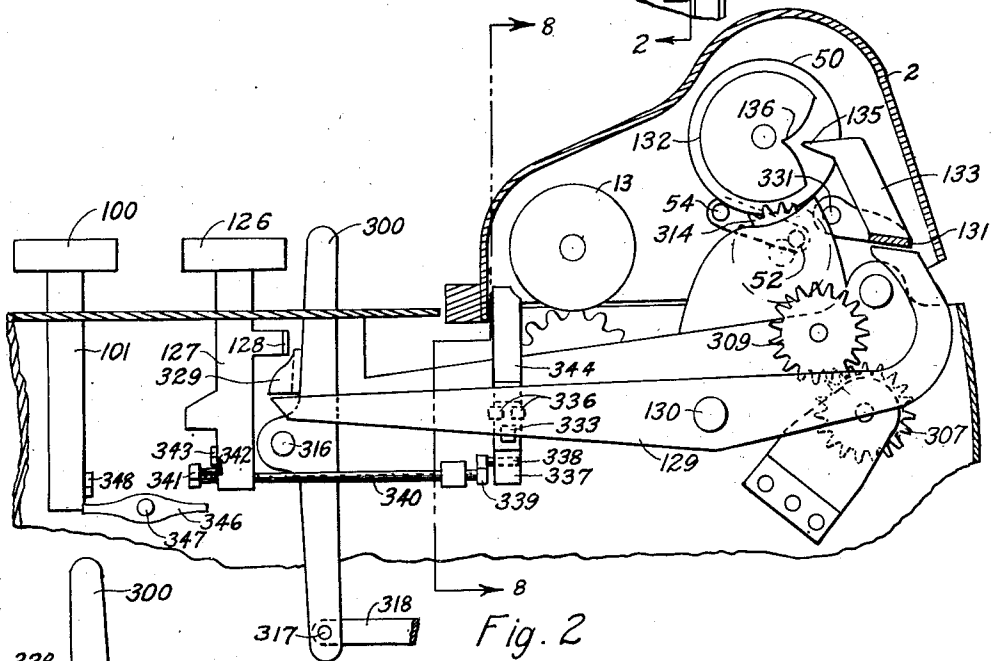
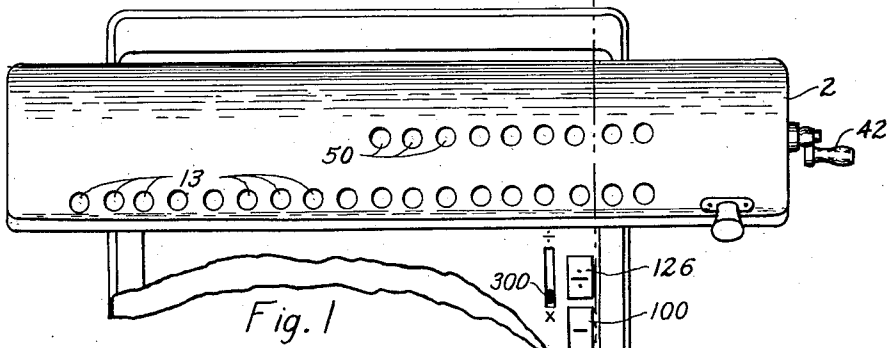
H. T. AVERY

1,910,738

LOCKING AND CLEARING MECHANISM FOR CALCULATING MACHINES

Filed June 18, 1927

3 Sheets-Sheet 1



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Harold J. Avery

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3 Sheets-Sheet 2

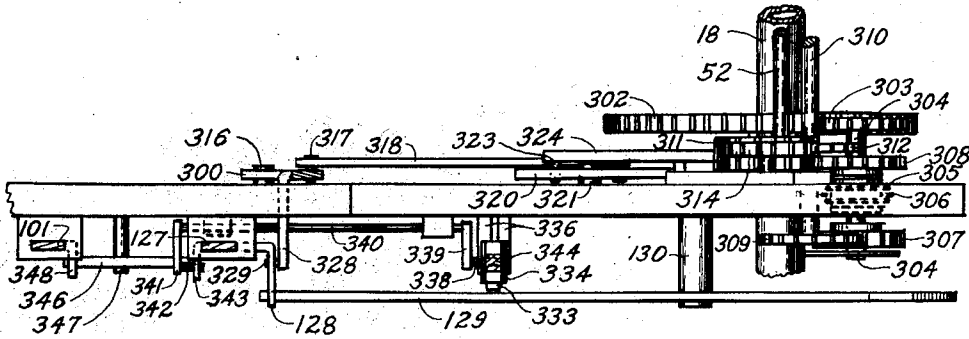


Fig. 4

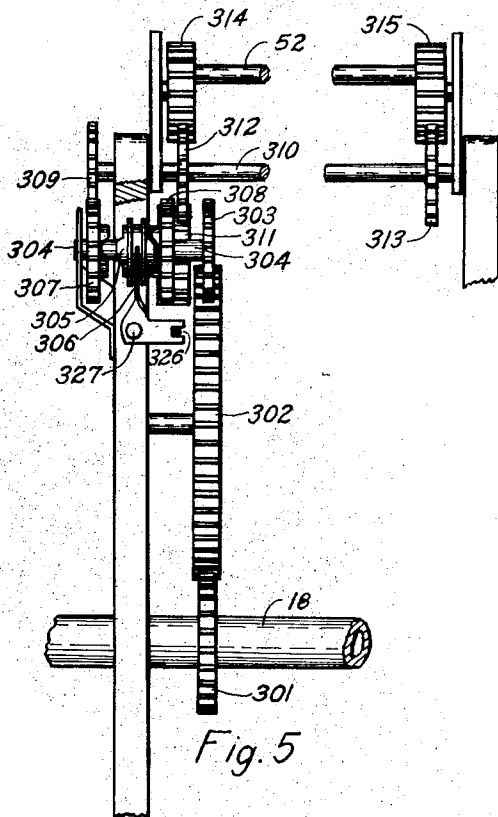


Fig. 5

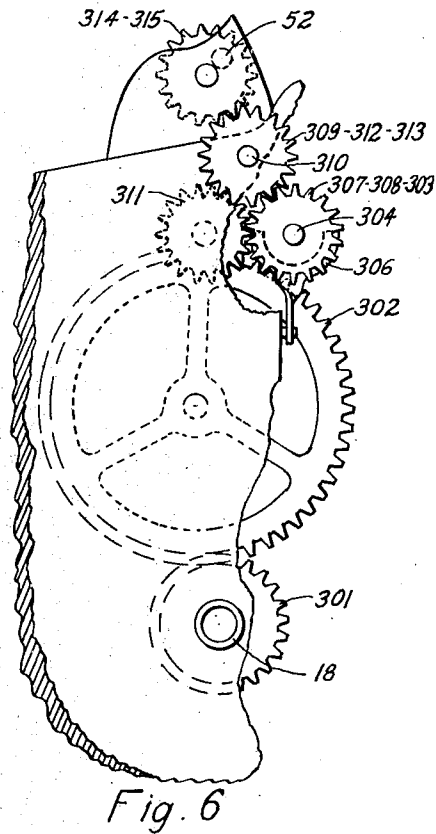


Fig. 6

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3 Sheets-Sheet 3

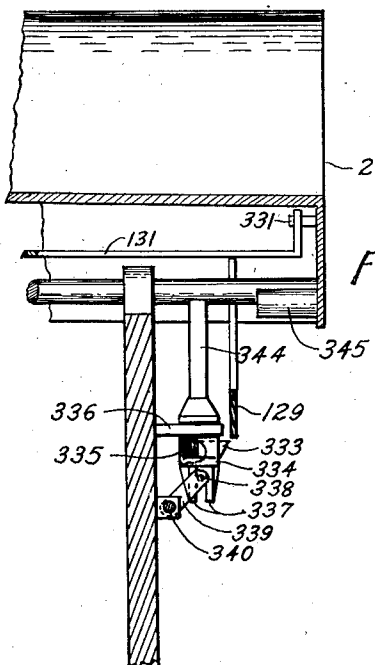


Fig. 8

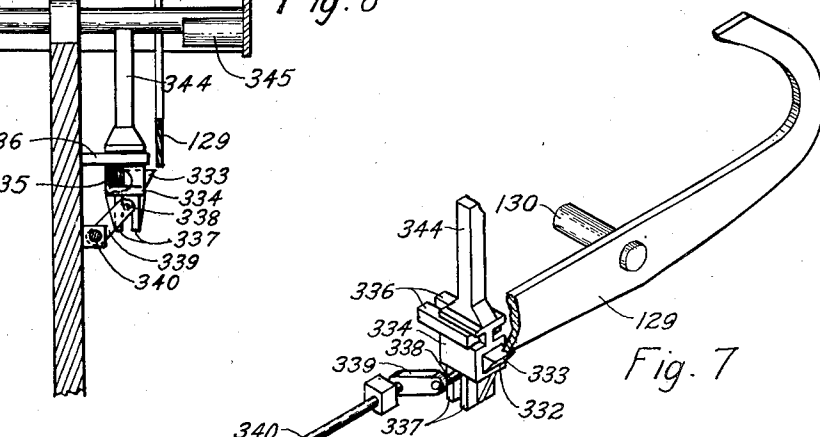


Fig. 7

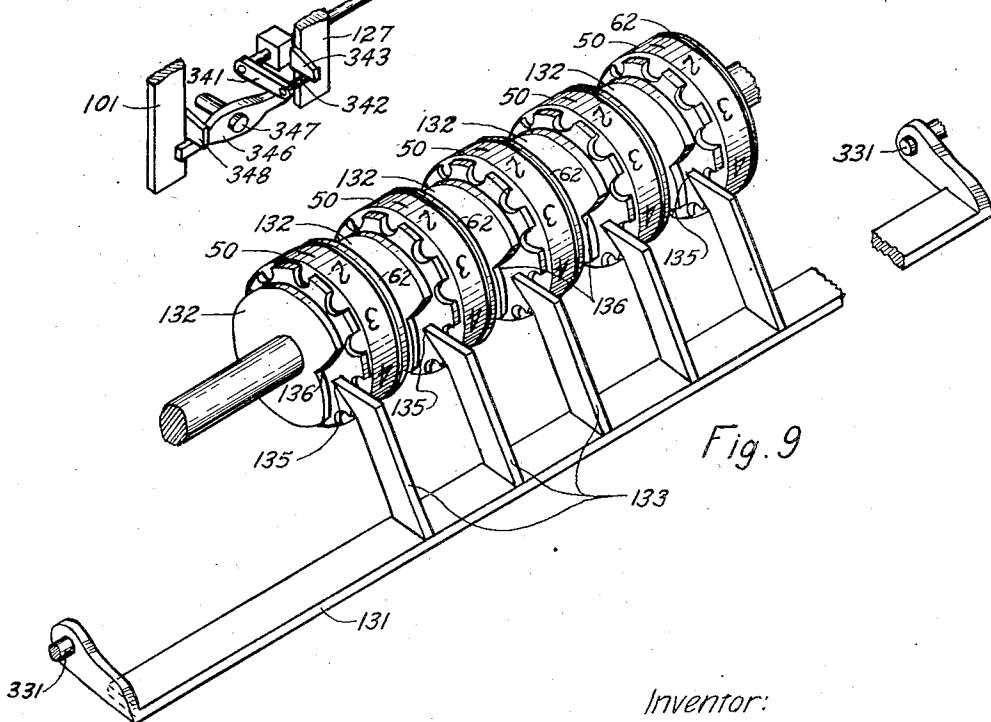


Fig. 9

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## UNITED STATES PATENT OFFICE

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## LOCKING AND CLEARING MECHANISM FOR CALCULATING MACHINES

Application filed June 18, 1927. Serial No. 199,840.

This invention relates to mechanism interconnecting the operating keys and the counting wheels of a calculating machine capable of automatically performing division, in such a manner as to eliminate the personal error in operation.

The principal purpose of the invention is to provide, in a calculating machine capable of automatically carrying out the process of division, means for preventing the performance of such a division without the counting wheels on which the quotient is to be registered being first cleared and properly connected to correctly register the result of the division. More specifically this includes in my invention means for automatically clearing the counting wheels by depression of the divide key if they have been cleared previous to registering the dividend, means for locking the divide key to prevent automatic division until the counting wheels are cleared if they are too far from the cleared position to permit of such automatic clearing, means to prevent such automatic clearing taking place during the process of division, and means for automatically, by the depression of the divide key, connecting the counting wheels to record the negative turns of the registering mechanism, if they are not already so connected.

A further object of the invention is to adapt the mechanism controlling automatic division to a machine having counting wheels connected by carry mechanism. An object in so doing is to eliminate the necessity for special apparatus to stop the division if it is commenced with the carriage to the left of its proper position, which special apparatus is necessary to prevent possible false indication if the counting wheels are not connected by carry mechanism. Another object in so doing is to combine in the same machine the advantages of automatic division and of short-cut multiplication with direct registration of multiplier.

Other objects and advantages will hereinafter appear.

In addition to the above novel results, several constructional features of the invention will be apparent from the following

specifications and claims. The invention consists in the novel construction and combination of parts as hereinafter set forth.

There is described in the following specifications and illustrated in the accompanying drawings a preferred embodiment of the invention as applied to a calculating machine of the general type and character described in my copending application No. 144,034, filed October 25, 1926, but having counting wheels with carry mechanism similar to that shown in the United States patent to George C. Chase, No. 1,504,741, except for the elimination of one of the two sets of counting wheels shown in the Chase patent, and the provision of means for reversibly connecting, at will, the remaining set of counting wheels.

In the drawings:

Fig. 1 is a top plan view of a portion of the calculating machine showing particularly the shiftable carriage, and the operating keys and lever involved in this improvement.

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

Fig. 3 is a right side elevation of the mechanism controlling the reversing of the direction of operation of the counting wheels.

Fig. 4 is a plan of a portion of the mechanism, not including that in the shiftable carriage.

Fig. 5 is a rear elevation of the mechanism for driving the counting wheels.

Fig. 6 is a right side view of the same mechanism.

Fig. 7 is a perspective view, looking downward from the right front, showing the latch mechanism for preventing pressure on the divide key from clearing the counting wheels after division has commenced.

Fig. 8 is a vertical section on line 8—8 of Fig. 2.

Fig. 9 is a perspective view, looking downward from the right rear, showing the counting wheels and the locking and clearing mechanism.

The calculating machine described in my copending application No. 144,034, above mentioned, is equipped with counting wheels,

each independent of the other and having nineteen figures on the circumference, a black series running from "0" to "9" for recording positive turns, and a red series running from the same "0" to "9" in the opposite direction for recording backward turns of the registering mechanism. The machine, there described, is capable of automatically performing division and of shifting the carriage into the proper place for commencing said division if the divide key is depressed with the carriage to the right of the proper position: if depressed with the carriage to the left thereof, however, the division is stopped by special mechanism provided for the purpose. The calculating machine of which the mechanism described herein is a part, is identical with the machine described in my copending application with the following exceptions:

The counting wheels have ten figures only, running continuously from "0" to "9" around the wheel in a clockwise direction as viewed from the right. These counting wheels are connected by carry mechanism similar to that described in United States Patent No. 1,504,741, above mentioned, but instead of there being two independent sets of counting wheels (one recording in each direction) as shown in said patent, one set only is provided which may be reversibly connected at will, to drive the counting wheels in either direction desired, by mechanism provided for the purpose and controlled by means of lever 300. The special mechanism provided in my copending application (and there numbered parts 266 to 277 inclusive) for stopping an automatic division if commenced with the carriage too far to the left is omitted from the present machine, because the counting wheel carry mechanism insures the recording of a proper result in such an instance. The automatic locking and clearing mechanism is revised to provide room for the counting wheel carry mechanism and to allow of automatically clearing the counting wheels when displaced from "0" one position in either direction. A special lock is also provided to prevent false clearing of the counting wheels during division, which might otherwise take place with the clearing mechanism as revised.

Throughout these specifications the "back" of the machine is considered to be that part farthest from the operator, namely the end along which the carriage is supported; the "front" that part nearest the operator; the "right" and "left", the sides to operator's right and left respectively.

In the drawings the numeral 2 designates an endwise shiftable carriage, wherein are mounted numeral wheels 13 and counting wheels 50. These counting wheels 50, as well as the carry mechanism 54 related there-

to, are driven in either direction desired by the rotation of the eccentrically mounted shaft 52, in a manner similar to that described for the similarly numbered parts in Patent No. 1,504,741, above mentioned. However, whereas in the machine described in said patent the direction of rotation of shaft 52 and counting wheels 50 can only be reversed by a reversal of the registering mechanism, I provide means for reversing the direction of rotation of said parts with respect to the registering mechanism, as follows:

Rigid with shaft 18 (see Figs. 5 and 6), through which the driving power is transmitted to the registering mechanism as described in my copending application, above mentioned, is a gear 301, meshing with a gear 302, which in turn drives gear 303 rigid with shaft 304. Slidably mounted on shaft 304, but keyed to it so as to rotate with it, is a shiftable collar 305, the longitudinal position of which is controlled by shifting-fork 306 (see Figs. 3 and 5). On shaft 304, immediately to the right and left respectively of collar 305 (left and right respectively as viewed in Fig. 5), are two gears 307 and 308, each free to turn upon shaft 304, but not to slide along it. The ends of collar 305 are notched so as to engage similar notches on the faces of gears 307 and 308, when brought against such faces. Thus when collar 305 is shifted to the right it engages gear 307 in such a manner as to cause said gear to rotate with the collar and with shaft 304 to which the collar is keyed. When shifted to the left it similarly engages gear 308. Gear 307 meshes with gear 309 rigid with shaft 310, while gear 308 meshes with gear 311, which in turn meshes with gear 312 also rigid with shaft 310. Thus the rotation of gears 307 and 308 will always be opposite in direction, whichever one collar 305 is against turning with shaft 304 and the other in the opposite direction. Gear 312, and gear 313 near the opposite end of shaft 310, mesh respectively with gears 314 and 315, between which shaft 52 is eccentrically mounted.

Thus whenever the registering mechanism is rotated shaft 52 is revolved about the axis of gears 314 and 315, the direction, for a given direction of rotation of the registering mechanism, depending upon the lateral position of collar 305. The entire arrangement is such that when collar 305 is against gear 308 positive turns of the registering mechanism are positively recorded on the counting wheels, while when collar 305 is against gear 307 negative turns are so recorded. The position of collar 305 is controlled by lever 300 as follows:

Lever 300 is pivotally mounted on the framework of the machine at 316, and pivotally attached at 317, near its lower end to bar 318, which in turn is pivotally attached

at 319 to member 320 (see Fig. 3). Thus moving the upper end of lever 300 toward the back of the machine will pull bar 318 forward and rotate member 320 forward on its fixed pivot 321. In member 320 is a diagonal slot 322 into which extends pin 323, rigid with member 324, which is mounted on fixed axis 325. The forward rotation of member 320 will lower pin 323 and raise outer end 326 of member 324. This will rotate shifting-fork 306 on its fixed axis 327 (Fig. 5) in such a manner as to bring collar 305 into contact with gear 307, thus engaging the counting wheels for negative recording, while moving the upper end of lever 300 toward the front of the machine will reverse the process, bringing collar 305 into contact with gear 308 and engaging the counting wheels for positive recording. For division, lever 300 should be in the first position above described, namely toward the back of the machine, and it is automatically thrown into that position, if not already there, by the depression of the divide key, as follows:

Extending laterally from lever 300, slightly above pivot 316, is a projection 328 rigid with the lever (see Figs. 2 and 4). The outer end of this projection is bent forward into a lip 329, which when lever 300 is forward extends under projection 128 rigid with stem 127 of divide key 126. Lip 329 is so shaped that the depression of the divide key will bring projection 128 against a slanting face of the lip (if lever 300 is forward) in such a manner as to force the lip back thereby rotating lever 300 backward on its pivot 316, and engaging the counting wheels for negative registration.

The possibility of an automatic division calculation being started without the counting wheels being properly cleared is prevented as follows:

Rigidly attached to each counting wheel 50 there is, in addition to disc 62 which functions in connection with the carry mechanism, a circular disc 132 having a notch 136. Directly back of each disc 132 is a lever 133, having a projection 135. All of these levers 133 are mounted on a bar 131 which is pivotally attached to carriage 2 at pivots 331. The relative relation of discs 132 and levers 133 is such that notch 136 on any disc 132 will be opposite projection 135 on its respective lever 133 when the counting wheel 50 to which the disc is attached is set on "O". When all counting wheels are set on "O" an upward rotation of bar 131 and the attached levers 133 will cause projections 135 to enter their respective notches 136. Notch 136 is of such size that when counting wheel 50 is displaced one position from "O" in either direction projection 135 will be opposite the slanting side of notch 136, and the upward rotation of bar 131 will cause projection 135 to press

against the side of the notch and rotate the counting wheel back to its "O" position. If any counting wheel is displaced more than one position from "O", a portion of the circular periphery of disc 132 will be opposite projection 135 and thereby prevent bar 131 being rotated upward into the position it assumes when projections 135 enter notches 136.

Pivotally attached to the frame of the machine at 130 is a lever 129, the forward end of which is directly beneath projection 128 of stem 127 of divide key 126, and the rear end of which rests beneath bar 131, above described. The depression of divide key 126, thereby rotates bar 131 upward on its pivots 331. If all counting wheels are at "O" projections 135 thereupon enter their respective notches 136 and a full depression of the divide key is possible. If the counting wheels were cleared prior to registering the dividend but have not been cleared since, one or more of them will be displaced one position from "O", the direction of the displacement depending upon which position lever 300 was in when the dividend was registered. In such a case the depression of the divide key will force projections 135 against the sides of the notches 136 on the displaced wheels and bring them back to "O", in the manner previously mentioned, before the full depression of the divide key, necessary to start the process of division, is reached. If any of the counting wheels are further displaced from "O", the full upward rotation of bar 131 will be impossible as previously mentioned, and the full depression of the divide key and the commencement of automatic division therefore impossible. It will then be necessary to clear the counting wheels by means of crank 42 before automatic division can be commenced.

With notch 136 shaped so that pressure on the divide key will return a wheel displaced one position in either direction, which arrangement is desirable in order to clear from the counting wheels the indication placed thereon by the recording of the dividend regardless of the position of lever 300 during such recording, pressure on the divide key after the commencement of division would tend to clear from the counting wheels the result of the division as rapidly as it might be registered, if special means were not provided to prevent it doing so. While an instantaneous depression of the divide key is all that is necessary to start an automatic division the average operator is liable to continue pressure on the divide key until after the counting wheels have commenced to revolve. The motion of the first counting wheel will force the divide key upward by the pressure of the side of notch 136 against projection 135, as transmitted to the divide

key through members 133, 131, 129, 128, and 127. As soon, however, as the actuating member 54 releases the counting wheel in the "1" position pressure on the divide key would return it to "O". To avoid this, latch 332 is provided, which will hold the front end of member 129 up until the divide key is completely released. The operation of this latch is controlled as follows:

The latch consists of a bevelled bolt 333 slidably mounted in latch-box 334 (see Figs. 7 and 8), and normally held in its protruded position by the pressure of spring 335 within said box. The latch-box is slidably mounted upon lateral guides 336. Rigid with the box and extending vertically downward from it are two guide plates 337 between which pin 338 is free to move. This pin is rigid with crank arm 339, which is rigid with shaft 340, which in turn is rotatably attached to the frame. Rigid with the opposite end of shaft 340 is crank arm 341 and pin 342, which extends under projection 343 of divide key stem 127. This entire arrangement is such that whenever the divide key is depressed shaft 340 is thereby rotated and latchbox 334 shifted to the right close to member 129. The same depression will lower member 129 as previously explained, so that by the time that latch 333 reaches the plane of member 129 it will press against the side of said member and be forced back into the latch-box. Latch-box 334 is retained in this position by friction on guides 336 even though the divide key be raised. As soon as the process of division commences, the front end of member 129 will be forced upward, through the action of the counting wheel discs in the manner previously described, into a position immediately above latch 333, with the result that the latch will snap out beneath said member under the action of spring 335, and prevent the lowering of member 129.

The latch is returned to a position clear of member 129 at the close of the division operation as follows:

If an automatic division is carried to completion it is stopped by carriage 2 coming into its extreme left position as described in my copending application, above mentioned. If the operator desires to stop the operation sooner this is accomplished by depressing the minus key. In order to provide for the return of latch-box 334 when the division is carried to completion, projection 344 extends upward from the box into a position where it is engaged by bumper 345 of carriage 2 as the carriage comes into its extreme left position. To provide for the return if the division is stopped sooner by depression of the minus key, a lever 346 is mounted on fixed pivot 347 and has one end extending under crank arm 341 and the other under projection 348 of minus key

stem 101 in such a manner that when the minus key is depressed crank arm 341 will be raised thereby returning latch-box 334 to its original position.

It is understood that the embodiment of the invention described herein is only one of the many embodiments this invention may take, and I do not wish to be limited in the practice of the invention nor in the claims, to the particular embodiment set forth.

What I claim is:—

1. In a calculating machine, counting wheels, a movable member adapted to control the machine to perform automatic division, means including a lever actuated by said movable member for clearing the counting wheels when the counting wheels are displaced a limited amount from zero position, means for preventing such clearing during the division calculation, including means to restrain the above mentioned lever, and means actuated by said movable member to move the restraining means into position to engage the lever.

2. In a calculating machine, a movable member for instituting calculation, counting wheels and means actuated by the movable member for clearing same when the counting wheels are displaced a limited amount from zero position, means for preventing such clearing during calculation, including restraining means and means for moving said restraining means into an operative position at the beginning of a calculation including a rotatable shaft actuated by the movable member mentioned above and a crank arm rigid with said shaft and adapted to move the restraining means.

3. In a calculating machine, counting wheels, means operative, if the digits on the counting wheels are within a pre-determined range, to clear the counting wheels immediately prior to a division calculation, means for preventing similar clearing during the calculation, including a restraining element and means adapted to move said element into an operative position at the commencement of the calculation and into an inoperative position at the completion of the calculation.

4. In a calculating machine capable of automatically performing division, counting wheels, means for clearing from the counting wheels prior to the commencement of such division the digits registered thereon, when said digits are within a predetermined range, means including a restraining element for preventing similar clearing during the division calculation, and means adapted to again permit such clearing after the completion of the calculation, including means for automatically moving the restraining element into an inoperative position at the completion of the calculation.

5. In a calculating machine, a laterally

shiftable carriage, counting wheels, means operative if the digits on the counting wheels are within a predetermined range, to automatically clear the counting wheels prior to a division calculation, means including a latch for preventing similar clearing during the calculation, and means for again permitting such clearing after the completion of the calculation, including means for automatically moving the latch into an inoperative position at the completion of the calculation, said means including a member engaged by the carriage as it is brought into its extreme left position, and adapted to move the latch into an inoperative position, upon being thus engaged.

6. In a calculating machine, a key adapted to stop the machine at the option of the operator, a laterally shiftable carriage, counting wheels, means operative if the digits on the counting wheels are within a predetermined range, to automatically clear the counting wheels prior to an automatic division calculation, means including a restraining element for preventing similar clearing during calculation, and means for again permitting such clearing after the completion of the calculation, including means for automatically moving the restraining element into an inoperative position at the completion of the calculation, said means including a member engaged by the carriage as it is brought into its extreme left position, and adapted to move the restraining element into an inoperative position, upon being thus engaged, and a member actuated by the above mentioned key and adapted to similarly shift the restraining element, upon being so actuated.

7. In a calculating machine capable of automatically performing division, counting wheels and means, operative when the wheels are within a predetermined range of positions, for automatically clearing same at the commencement of automatic division, means including a restraining element for preventing similar clearing during the calculation, a movable member adapted to stop the machine at the option of the operator, and means actuated by said movable member to render the restraining element inoperative following the actuation of said member.

8. In a calculating machine capable of automatically performing division, counting wheels and means, operative when the wheels are within a predetermined range of positions, for automatically clearing same at the commencement of automatic division, means including a restraining element for preventing similar clearing during the calculation, a movable member adapted to stop the machine at the option of the operator, and means actuated by said movable member to render the restraining element inoperative following the actuation of said member,

said means including a rotatable shaft actuated by the movable member and a crank operated by said shaft and adapted to shift the restraining element into an inoperative position.

9. In a calculating machine, counting wheels for displaying the quotient, a settable member for initiating an automatic division operation, and means positioned by the counting wheels for locking said member when any of the counting wheels are more than one step removed from the zero position.

10. In a calculating machine, the combination of counting wheels for displaying a quotient figure, a settable member for initiating an automatic division operation, and means including a notched disc in conjunction with each counting wheel for restraining said member when the counting wheels are displaced from a given range of positions.

11. In a calculating machine, the combination of a counting wheel for displaying a quotient figure, a divide key, and means including a notched disc positioned by the counting wheel arranged to prevent a full depression of the divide key when the counting wheel is displaced more than one step from zero position.

12. In a calculating machine, the combination of a counting wheel, a movable member for initiating an automatic division operation, another member actuated thereby and adapted to engage, when the counting wheel is displaced a limited amount from its zero position, a rotatable member adapted to rotate the counting wheel, upon such engagement, into its zero position.

13. In a calculating machine, the combination of counting wheels for displaying a quotient figure, a settable member for initiating an automatic division operation, means, including a notched disc associated with each counting wheel and a lever associated with each such disc, actuated by the above mentioned settable member, and adapted to clear the counting wheels upon operation of the settable member when the counting wheels are within a predetermined range of positions, and to prevent the actuation of said member when the counting wheels are displaced from said range of positions.

14. In a calculating machine having a numeral wheel actuator adapted to be reversibly actuated and a counting wheel actuator reversibly connected thereto so as to register either forward or backward operations of the numeral wheel actuator on the counting wheel, the combination of a settable member for initiating an automatic division operation and means for connecting the counting wheel actuator to the numeral wheel actuator in the manner adapted to register backward operations of the numeral

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- wheel actuator, said last mentioned means including two members adapted to be rotated in opposite directions by the operation of the numeral wheel actuator and a member adapted to be shifted into conjunction with one of said members by the operation of the above mentioned settable member in initiating an automatic division operation.
15. In a calculating machine having a numeral wheel actuator adapted to be reversibly driven and a counting wheel actuator reversibly connected thereto so as to register either forward or backward operations of the numeral wheel actuator on the counting wheel, the combination of a settable member for initiating operation of the machine and means for connecting the counting wheel actuator to the numeral wheel actuator in the manner adapted to register the operations of the numeral wheel actuator in the direction initiated by the settable member, said means including two members adapted to be rotated in opposite directions by the operation of the numeral wheel actuator and a member adapted to be shifted into conjunction with one of said members by the actuation of the above mentioned settable member.
16. In a calculating machine, a numeral wheel actuator, counting wheels reversibly connected thereto so as to register either forward or backward operations of the actuator, a lever for reversing said connection, a divide key, and projections on the key and on the lever adapted to automatically place the lever, upon depression of the key, in the proper position for carrying out a division calculation.
17. In a calculating machine, the combination of a movable member for initiating the operation thereof to perform a calculation in division, counting wheels, means including a lever actuated by the movable member for clearing from the counting wheels the figures registered thereon, when the digits thereof are within a predetermined range, and means including a stop adapted to engage the above mentioned lever, for preventing such clearing taking place during the progress of the division operations initiated by the movable member.
18. In a calculating machine, counting wheels, a movable member adapted to actuate the machine to perform automatic division, means including a lever actuated by said movable member for clearing the counting wheels prior to the commencement of a division calculation when said wheels are within a predetermined range of positions, and means for preventing such clearing of the counting wheels during the division calculation, including means to restrain the above mentioned lever.
19. In a calculating machine, the combination of counting wheels, means operative when the wheels are within a predetermined range of positions for automatically clearing same at the commencement of a division calculation, means including a restraining element to prevent similar clearing during the calculation, and means to automatically render such clearing again possible upon the completion of the calculation by rendering the restraining element inoperative.
20. In a calculating machine, the combination of a counting wheel for displaying a quotient figure, a notched disc rotatably positioned thereby, a member manually movable to initiate an automatic division operation and means including the notched disc adapted to restrain movement of said member when said disc is displaced from certain predetermined positions.
21. In a calculating machine, counting wheels for displaying the quotient, a member manually movable to initiate a division operation and means for locking said member against movement whenever any counting wheel is displaced from a predetermined range of positions, said means including a notched disc attached to each counting wheel, a lever associated with each disc, a member to which all said levers are secured, and a lever adapted to transmit motion of the member first above mentioned, to said lever.
22. In a calculating machine, the combination of counting wheels for displaying a quotient, a settable member for initiating automatic division operation of the machine, and means actuated by said member, for returning to zero the counting wheels displaced from zero a predetermined distance.
23. In a calculating machine, the combination of counting wheels for displaying a quotient figure, a member manually movable for initiating an automatic division operation and means controlled by the counting wheels operative to prevent the actuation of said member while any counting wheel is displaced from a predetermined range of position, and to clear the counting wheels immediately prior to the commencement of division, upon actuation of said member, when the counting wheels are within said predetermined range.
24. In a calculating machine, the combination of a settable member for initiating an automatic division operation, counting wheels for displaying a quotient figure, a plate associated with each counting wheel having a periphery formed, when actuated by the settable member, to return the counting wheel displaced a limited amount from zero, to zero position, and for preventing operation of said settable member, when the counting wheels are displaced from zero by more than said limited amount.
25. In a calculating machine, the combination of a settable member for initiating the

- operation of division, counting wheels for carriage for adjusting said register to zero, displaying the quotient figure and means actuated by the movement of the setttable member for returning to zero all counting wheels displaced a limited amount from zero position, said means including a plate associated with each numeral wheel and a member arranged to engage and move said plate.
26. In a calculating machine adapted to perform division, numeral wheels comprising a quotient register, a member operable to initiate an automatic division operation, and means controlled by the said numeral wheels for preventing operation of said member.
27. In a calculating machine, a register for containing the dividend, a quotient register comprising numeral wheels, one of which is moved one step by the introduction of the dividend into its register, a key movable to initiate the division operation and means operated by the movement of the key for resetting the displaced numeral wheel to zero in advance of the movement of the wheel in the division operation.
28. In a calculating machine, a dividend register, numeral wheels comprising a quotient register, one of which wheels is moved one step by the introduction of the dividend into its register and a key movable to initiate the division operation and to reset the displaced numeral wheel to zero prior to the movement of the numeral wheels in the division operation.
29. In a calculating machine, registering mechanism, counting mechanism selectively setttable to count either additive or subtractive operations of said registering mechanism, a member operable to initiate subtractive operation of said registering mechanism, and means controlled by said member for setting said counting mechanism.
30. In a calculating machine having a numeral wheel actuator, the combination of a setttable member for initiating an automatic operation, counting wheels, and means actuated by movement of the setttable member for adjusting said counting wheels to zero.
31. In a calculating machine having a numeral wheel actuator, the combination of a divide key, counting wheels, and means actuated by depression of the divide key for adjusting said counting wheels to zero.
32. In a calculating machine, a rockable member, a carriage carrying a register and shifttable with respect to said rockable member, and mechanism for adjusting said register to zero carried by said carriage and operable in any of a plurality of shifted positions of said carriage by rocking said member.
33. In a calculating machine, a frame, a carriage carrying a register and laterally shifttable on said frame, mechanism comprising a rockable element carried by said
- and means mounted in said frame for operating said element in any of a plurality of shifted positions of said carriage.
34. In a calculating machine, a rockable member, a carriage carrying a register and shifttable with respect to said rockable member, and mechanism comprising a rockable element carried by said carriage for adjusting said register to zero and operable in any of a plurality of shifted positions of said carriage by rocking said member.
35. In a calculating machine having registering mechanism and counting mechanism selectively setttable to count either additive or subtractive operations of said registering mechanism; the combination of a member for initiating operation of the machine, and means controlled by said member for setting said counting mechanism.
36. In a calculating machine having registering mechanism, counting mechanism, controlling mechanism for determining additive or subtractive operation of both said mechanisms, and a setttable element for reversing the direction of operation of said counting mechanism with respect to that of said registering mechanism; the combination of a member for initiating operation of the machine, and means controlled by said member for setting said element.

Signed at San Luis Obispo, California  
this 29th day of April 1927.

HAROLD T. AVERY.