

Sept. 23, 1941.

H. T. AVERY

2,256,799

CALCULATING MACHINE

Original Filed July 15, 1931

2 Sheets-Sheet 1

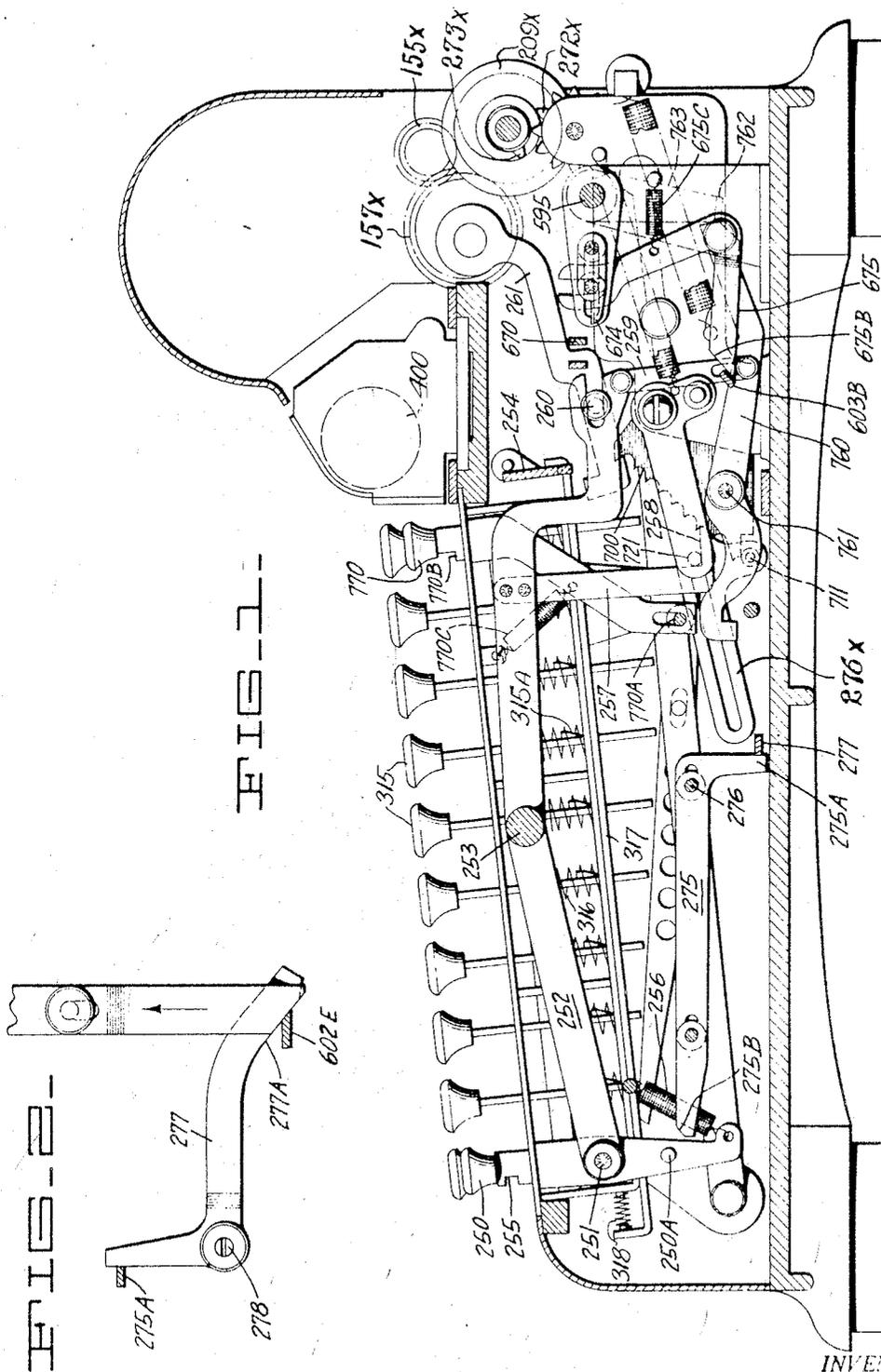


FIG. 1

FIG. 2

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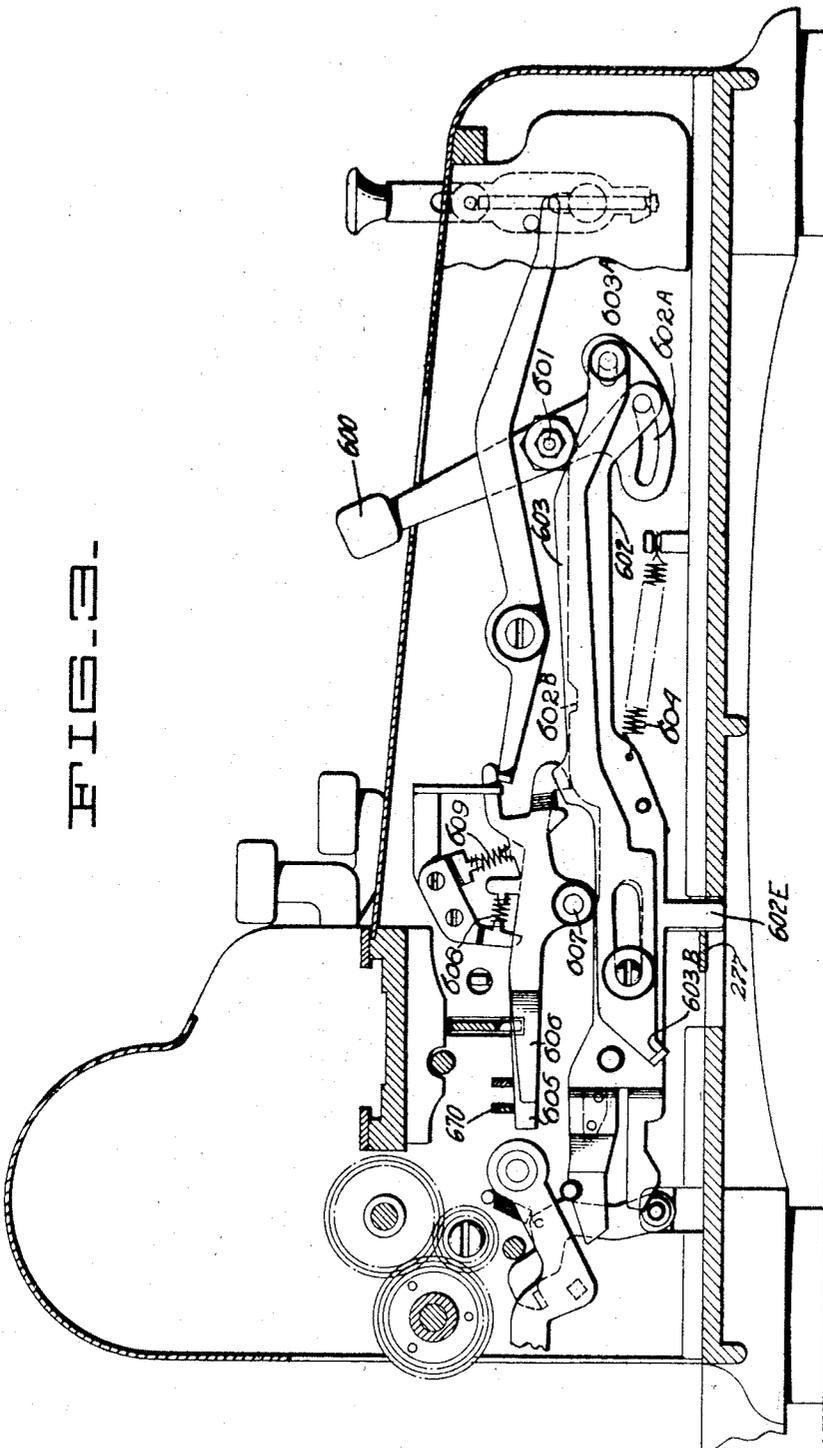


FIG. 3.

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## UNITED STATES PATENT OFFICE

2,256,799

## CALCULATING MACHINE

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corporation of California

Original application July 15, 1931, Serial No.  
550,855. Divided and this application May 26,  
1934, Serial No. 727,709. Renewed December  
29, 1938

## 10 Claims. (Cl. 235—79)

The present application is a division of the joint application of Harold T. Avery and Gustav Lerch, Serial No. 550,855 filed July 15, 1931, which has resulted in Patent Number 2,014,013 issued September 10, 1935.

The principal object of the invention is the provision of automatically operable means for retaining the divisor setting during automatic division operations, notwithstanding the previous adjustment of the machine.

Other objects will appear in the course of the following description, reference being had to the accompanying drawings, in which:

Figure 1 is a longitudinal sectional view of the machine, illustrating the present improvement and the cooperating machine structure;

Figure 2 is a detail plan view of portions of the automatic division controlling means and add key releasing means; and

Figure 3 is a longitudinal sectional view of the machine, illustrating the automatic division controlling means.

For a disclosure of a calculating machine provided with automatic division mechanism and illustrating the mechanism cooperating with the present invention, reference is made to the specification of the above mentioned patent. It will be apparent, however, that the invention may be applied to any calculating machine of this general class.

Calculating machines are ordinarily provided with an add key which, while maintained in its depressed position, causes the release of all depressed keys of the keyboard and may also limit the actuator to one full revolution for each depression of the plus and minus bars. Due to the construction and operation of this add key mechanism, the performance of automatic division is impossible while said key is in its depressed position. In the machine comprising the present invention, the release of said add key is automatically effected upon displacement of the automatic division control lever to its operative position. The construction of the mechanism accomplishing this end will be described in full hereinafter.

As described in detail in the aforesaid patent, the keyboard, by means of which factors are entered into the machine, and upon operation of the actuator set into numeral wheels 400, comprises a plurality of banks of depressible keys 315 normally maintained in raised position by means of springs 316 and adapted to be latched in depressed position by engagement of lugs 315A under latching slide 317 through which the key stems pass. The slide 317 is mounted to permit limited longitudinal movement thereof and is normally maintained in its forward position by spring 318 subject to movement to the rear during depression of any key 315 or upon rocking

of gate 254 which engages in front of the up-turned rear ends of the slides 317 of all the banks of keys 315.

The special key 250 (Figure 1) designated as the "add key", is provided to control the various mechanisms in the performance of addition. Said key 250 is pivoted at 251 to a lever 252 pivoted at 253 and normally held in its elevated position by a spring 256. The upper end of the key stem is provided with a notch 255 adapted to engage the cover plate upon depression of said key to temporarily retain it in operative position. The spring 256, being angularly tensioned between the lower extremity of the key and a fixed portion of the machine, also tends to rock the key into latching position.

The rear end of lever 252 is bifurcated and engages a pin 260 on a pitman 261 driven by gears 155x and 157x of the machine and operated, when raised into operative position by the depression of key 250, to release the keys by rocking the gate 254 near the end of each cycle of operation. The operation of this pitman in releasing the depressed keys is fully disclosed in the patent to Friden, Number 1,643,710, dated September 27, 1927.

Depression of the key 250 also disables the automatic carriage shift mechanism through means which will be described hereinafter.

As mentioned hereinbefore, proper functioning of the automatic division mechanism is impossible while the add key 250 (Figure 1) is maintained in its depressed position because of the automatic key releasing means. Therefore means have been provided for automatically releasing said depressed add key, said release being controlled by the rocking of the automatic division lever 600 to its operative position. This is accomplished by means of a horizontal slide 275 (Figure 1) slidably supported in the machine by pin and slot connections 276, the forward end of which is provided with a cam face 275B which lies immediately to the rear of a laterally projecting pin 250A on the lower extremity of the add key 250 in such a manner that a forward movement of said slide will result in a clockwise oscillation of said depressed key about its pivot point 251, thereby releasing the notch 255 from the supporting plate and permitting the cam face 275B to force the pin and consequently the key to its elevated position. The slide then being held underneath the pin prevents depression of the key during the course of a division operation. The necessary forward movement of the slide 275 is effected through the counter-clockwise oscillation of a bell crank 277 (Figure 2) pivotally mounted on machine base at 278, one arm of which is disposed immediately to the rear and in contact with a depending portion 275A of the slide 275. The other arm of the bell crank 277 is provided with a cam-

ming face 277A disposed in the path of a depending portion 602E of the main automatic division slide 602 (see also Figure 3). It is obvious that a rearward movement of the main division slide 602 to initiate a problem in automatic division will result in a rocking of the bell crank 277, thereby releasing the add key in the manner described above.

The automatic division control lever 600 is pivoted at 601 to the side wall of the machine and its upper end is brought toward the front of the machine to initiate a division operation. By this motion it moves the main division slide 602 and the supplemental division slide 603 toward the rear of the machine against the force of a spring 604 tensioned between the base of the machine and the main division slide. A short pin and slot connection 603A connects the supplemental division slide to the division lever so that this slide follows the movement of the division lever in both directions. The main division slide is, however, connected to the division lever by a longer pin and slot connection 602A.

This longer pin and slot connection 602A is so arranged that the main division slide will be pushed to the rear by a forward rocking of the division lever but will not be returned by the restoration of the division lever to inoperative position. A pair of latching pawls 605 and 606 are pivoted side by side on the side frame of the machine at 607. The heads of both these pawls cooperate with a notch 602B in a widened portion of the main division slide into which they are pressed by their individual springs 608 and 609 compressed between the forward portion of the respective pawls and an extension of the side frame. By this means, the main division slide 602 is latched in the rear position to which it is forced by an operation of the division lever 600 until the two latching pawls 605 and 606 are concurrently raised.

As described in the aforesaid patent depression of a multiplier key results in the rotation of the accumulator acuator the number of times delineated on said key, during each rotation of which the tooth 273X on the main clutch housing 209X advances gear 272X one tooth and feeds toward the rear of the machine, slide 276X carrying pin 711, and during the last rotation of which the plate 700 (Figure 1) is moved to the rear by pin 711 to actuate instrumentalities for terminating the calculation. It is at this point in the operation that it is desired to initiate action of the shift clutch. For this purpose a member 760 is provided. Said member is pivoted to the plate 700 at 761 and abuts at the rear end thereof a laterally bent portion 762 of a lever 763, depending from the shift control shaft 595. Rearward motion of plate 700, therefore will rock shaft 595 and initiate operation of the shift clutch at the proper time, as described in the aforesaid patent.

Means are provided under control of the add key 250 for disabling this shift clutch control when said key is depressed. This key 250 is maintained in depressed position during straight adding and subtracting operations and acts to release the keyboard setup and to limit the rotation of the actuator to a single cycle in either direction unless a multiplier key is depressed to perform multiple additions for adding a certain number to the registered sum a plurality of times. For this purpose a link 257 (Figure 1) is attached to the lever 252 and has a foot 258 extending under pin 721 of the multiplier pin adjusting mechanism. Depression of the key 250 raises this link slightly,

bringing pin 711 into cooperation with the "one" step of plate 700 so that the plate will be moved during the first rotation of the actuator to cause disengagement of the actuator clutch. To prevent undesirable operation of the automatic carriage shift during the performance of multiple addition, a second link 259 is provided which is adapted to connect the rear end of lever 252 with an intermediate portion of the member 760. Raising of the rear end of lever 252 incident to the depression of the key 250 thus raises the rear end of member 760 so that when it is moved to the rear with plate 700, it will overshoot the laterally bent end 762 of lever 763 so that the shift clutch is not affected by such rearward movement.

The control of the carriage shift mechanism in automatic division operations is not affected by the setting of the add key. During division operations, carriage shifting is controlled by lever 670 (Figure 1) depressing nose 674 at the proper stage of the operation. This nose is normally held out from under this lever by spring 678C, but the movement of the division slide 603 (Figure 3) to operative position carries its lug 603B against the cam surface 675B of bell crank 675, rocking said bell crank counter-clockwise against the tension of spring 675C and carrying nose 674 under lever 670.

In certain calculating operations, it may be desirable to use the automatic multiplication mechanism without the automatic shift feature. For this purpose a special non-shift key 770 (Figure 1) has been provided. This is slidably and pivotally mounted by a slot and stud connection 770A and is provided with a notch 770B adapted to engage the upper supporting plate, and a spring 770C for retaining it in depressed position. The lower end of the key stem lies directly over the end of the lever 760, the operation of which has been described hereinbefore. It is evident that depression of the non-shift key 770 will rock the lever 760 about its pivot point 761, thereby disabling the carriage shifting mechanism during automatic multiplication operations in the manner described, but not affecting its operation in automatic division operations, for the reasons hereinbefore set forth.

Subject matter disclosed but not claimed herein is disclosed and claimed in application Serial No. 400,378 filed June 30, 1941 as a division hereof, and of application Serial No. 550,855 filed July 15, 1931 upon which Patent No. 2,014,013 was issued September 10, 1935.

I claim:

1. In a calculating machine having numeral wheels, and a keyboard comprising keys and means whereby said keys may be latched in set position; the combination with non-repeat mechanism comprising devices for automatically unlatching said keys and manually settable devices for rendering the automatic devices operable or inoperable, and control means operable to cause the machine to divide an amount registered on said numeral wheels by an amount set in said keyboard, including a member adjustable to control and to effect the operation, of connecting devices between the operating means and the non-repeat mechanism, settable by said adjustable member to disable the unlatching devices.

2. In a cyclically operable calculating machine having settable factor entering means, means for retaining said factor entering means in set position and control mechanism including a member for initiating a plural cycle operation; the com-

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bination of means for releasing said retaining means during the first cycle of operation of said machine, a manually settable device for selectively enabling or disabling said releasing means, and means controlled by said member upon movement thereof to initiate a plural cycle operation for setting said device to disable said releasing means.

3. In a cyclically operable calculating machine having settable factor entering means, means for retaining said factor entering means in set position and control mechanism including a member for initiating a plural cycle operation; the combination of means for releasing said retaining means during the first cycle of operation of said machine, a device selectively manually settable to enable or disable said releasing means, means for holding said device in one of such settings, and means controlled by said member upon movement thereof for rendering said holding means ineffective to hold said device and for resetting said device to the other of its said settings.

4. In a cyclically operable calculating machine having settable factor entering means, means for retaining said factor entering means in set position, and control mechanism including a member for initiating a plural cycle operation; the combination of an element operable to release said retaining means, a cyclically operable operating mechanism therefor including a device selectively adjustable to effect an operating connection between said operating mechanism and said element or disconnection of the same therefrom; and means controlled by said member upon movement thereof for adjusting said device.

5. In a cyclically operable calculating machine having settable factor entering means, means for retaining said factor entering means in set position, and control mechanism including a member for initiating a plural cycle operation; the combination of an element operable to release said retaining means, a cyclically operable operating mechanism therefor including a device selectively adjustable to effect an operating connection between said operating mechanism and said element or disconnection of the same therefrom; manually settable means for adjusting said device, and means controlled by said member upon movement thereof for setting said manually settable means.

6. In a cyclically operable calculating machine having settable factor entering means, means for retaining said factor entering means in set position, and control mechanism including a member for initiating a plural cycle operation; the combination of an element operable to release said retaining means, a cyclically operable operating mechanism therefor including a device selectively adjustable to effect an operating connection between said operating mechanism and said element or disconnection of the same therefrom; means including a key settable to adjust said device to effect disconnection of said operating mechanism from said element; means for holding said key in set position, and means controlled by said member upon movement thereof for releasing said key from said holding means and restoring the same from set position.

7. In a cyclically operable calculating machine having registering mechanism, a keyboard comprising settable keys and means whereby the same may be latched in set position; and control means operable to cause the machine to automatically divide an amount registered in said

registering mechanism by an amount set in said keyboard, including a member adjustable to initiate such operation; the combination with non-repeat mechanism comprising cyclically operable devices for releasing the means whereby the keys may be latched in set position and manually settable devices for rendering said cyclically operable devices effective or ineffective; of connecting devices between said member and the non-repeat mechanism for rendering said cyclically operable devices ineffective.

8. In a cyclically operable calculating machine having registering mechanism, a keyboard comprising settable keys and means whereby the same may be latched in set position; and control means operable to cause the machine to automatically divide an amount registered in said registering mechanism by an amount set in said keyboard, including a member adjustable to initiate such operation; the combination with non-repeat mechanism comprising an element operable to release said key latching means, a cyclically operable operating mechanism therefor including a device selectively adjustable to effect an operating connection between said operating mechanism and said element or disconnection of the same therefrom; of means controlled by said member upon movement thereof for adjusting said device.

9. In a cyclically operable calculating machine having registering mechanism, a keyboard comprising settable keys and means whereby the same may be latched in set position; and control means operable to cause the machine to automatically divide an amount registered in said registering mechanism by an amount set in said keyboard, including a member adjustable to initiate such operation; the combination with non-repeat mechanism comprising an element operable to release said key latching means, a cyclically operable operating mechanism therefor including a device selectively adjustable to effect an operating connection between said operating mechanism and said element or disconnection of the same therefrom; of manually settable means for adjusting said device, and means controlled by said member upon movement thereof for setting said manually settable means.

10. In a cyclically operable calculating machine having registering mechanism, a keyboard comprising settable keys and means whereby the same may be latched in set position; and control means operable to cause the machine to automatically divide an amount registered in said registering mechanism by an amount set in said keyboard, including a member adjustable to initiate such operation; the combination with non-repeat mechanism comprising an element operable to release said key latching means, a cyclically operable operating mechanism therefor including a device selectively adjustable to effect an operating connection between said operating mechanism and said element or disconnection of the same therefrom; of means including a key settable to adjust said device to effect disconnection of said operating mechanism from said element; means for holding said key in set position; and means controlled by said member upon movement thereof for releasing said key from said holding means and restoring the same from set position.

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