Dec. 6, 1927. 1,651,882

C. M. F. FRIDEN

CALCULATING MACHINE

Filed Oct. 15, 1925 2 Sheets-Sheet 1

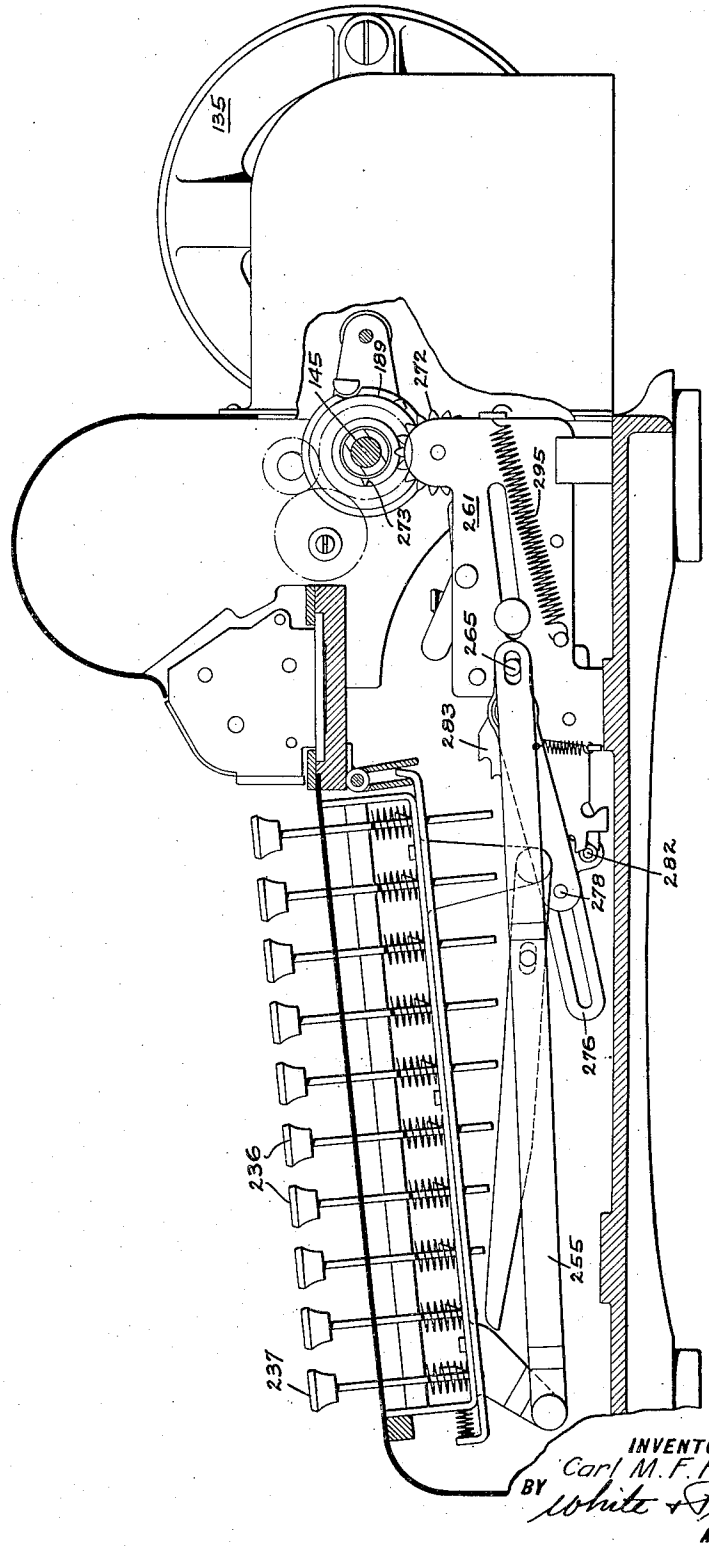

FIG. 1.

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FIG. 2.

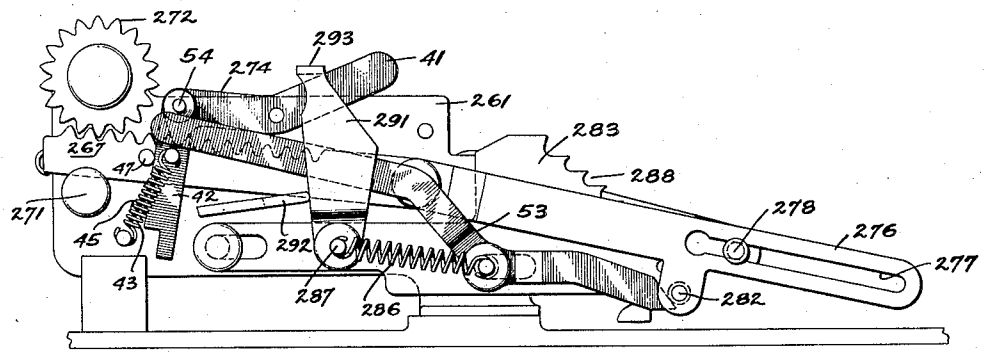


FIG. 3.

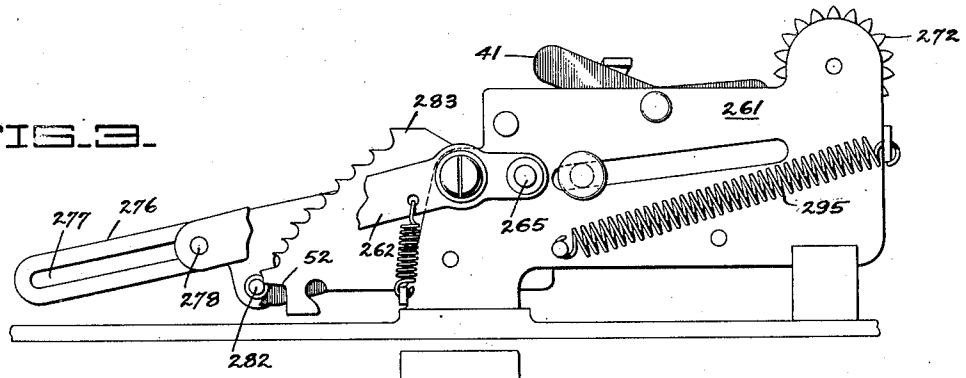


FIG. 4.

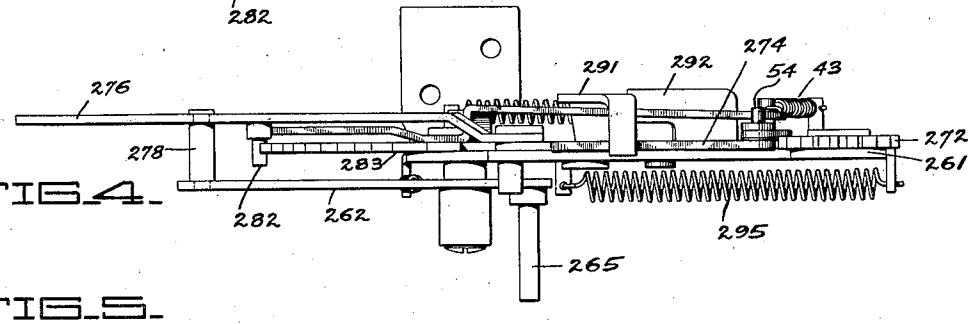
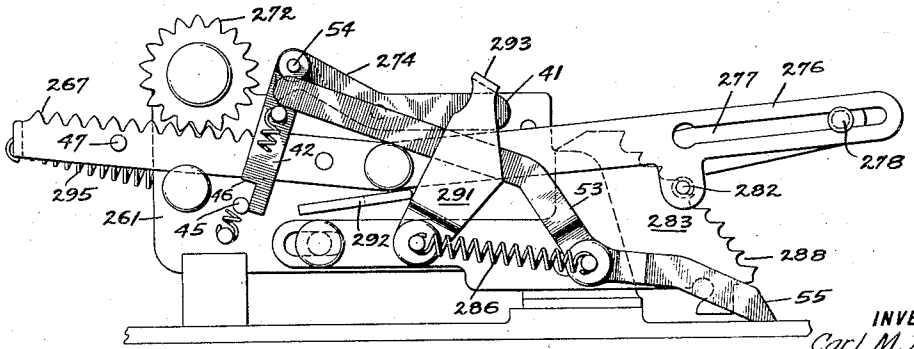


FIG. 5.



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Patented Dec. 6, 1927. 1,651,882

UNITED STATES PATENT OFFICE.

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CALCULATING MACHINE.

Application filed October 15, 1925. Serial No. 62,557.

The invention relates to power driven calculating machines, such as is disclosed in my copending application Serial No. 693,546 filed in the Patent Office on February 18, 1924, to which reference is made for a disclosure of the complete machine. Such machine embodies automatic means for predetermining the number of rotations of the actuator which performs the calculating operation. The values are introduced into the actuator and upon rotation of the actuator, are transferred to the counting mechanism which, for the purpose of making direct action of the selected values on the figure disc of the counting mechanism of highest value possible, is disposed in parallel displaceable relation to the axis of the actuator. The actuator is driven by an electric motor and a clutch or other comparable device is interposed between the motor and the actuator so that the actuator may be connected to and disconnected from the motor at the will of the operator. Such machine, as disclosed in my prior application, comprises a bank of keys, numbered from 1 to 9 inclusive, depression of any key serving to cause the motor to drive the actuator a number of times represented by the value of the depressed key. The present invention relates particularly to the device for controlling the operation of the clutch to stop the actuator and lock the actuator in full cycle position after it has rotated the number of times represented by the value of the depressed key. This mechanism includes a device which is set into adjusted position by the depression of a key and which subsequently operates, upon the rotation of the actuator, to operate the clutch to stop the rotation of the actuator.

An object of the present invention is to improve the construction and operation of the device for controlling the number of rotations of the actuator and for permitting the return of the actuator driven element to neutral or initial position after the device has operated to stop the rotation of the actuator. A further object of the invention is to provide a device of this character which is more positive in operation, to eliminate the possibility of error.

Another object of the invention is to provide means for disabling the automatically operated device so that the actuator may be rotated any desirable number of times at the will of the operator and be stopped by the subsequent action of the operator.

The invention possesses many other advantageous features, some of which with the foregoing will be set forth at length in the following description, where I shall outline in full that form of the invention which I have selected for illustration in the drawings accompanying and forming part of the present specification. In said drawings I have shown one embodiment of my invention, but it is to be understood that I do not limit myself to such form, since the invention, as set forth in the claims, may be embodied in a plurality of forms.

Referring to said drawings:

Figure 1 is a part side elevation, part section, of a calculating machine embodying my invention.

Figure 2 is a side elevation of the device for controlling the number of rotations of the actuator, the settable device being in neutral position, and the parts in normal position.

Figure 3 is a side elevation of the device, showing the opposite side of the device, with the parts in the same position as in Figure 2, a portion of the setting lever being broken away to disclose the construction.

Figure 4 is a top or plan view of the device shown in Figure 3.

Figure 5 is a side elevation of the device showing the parts in operative position to effect the stopping of the rotation of the actuator.

As disclosed in my prior application above referred to, the device of the present invention is employed to trip the clutch control lever to cause disengagement of the clutch and locking of the clutch housing when the actuator has rotated a predetermined number of times. In the drawings I have not shown the clutch control lever, since it is fully described in my prior application, and such clutch control lever is released by movement of lever 291, forming part of the present mechanism, and similarly numbered in my prior application. Wherever possible, I have employed similar reference characters in this application to those employed in the former application above mentioned, to more definitely position the present device in the machine of the prior application.

The actuator is driven by the electric motor 135, a clutch being interposed between

the motor and the actuator. This clutch is of the same construction as is disclosed in my prior application. The clutch housing 189 is connected to the actuator and the driving shaft 145 of the clutch is suitably connected to the electric motor. Arranged adjacent the clutch housing is a frame 261 carrying a sprocket 272 which is moved one step for each rotation of the clutch housing 189 and consequently for each rotation of the actuator. Formed on the clutch housing is a tooth 273, which engages the tooth of the sprocket 272 and moves the sprocket one tooth pitch for each revolution of the actuator. Slidably mounted on the frame 261 and in engagement with the sprocket 272 is a rack 267 which is normally held in retracted position and which is returned from extended position to retracted position by the spring 295. A spring pressed latch 274, having a tooth in engagement with the rack, normally holds the rack in extended position and prevents retrograde movement thereof.

Pivotally connected to the rack 267 is an arm 276, having a slot 277 therein in which there is disposed the pin 278 which is secured to the angularly adjustable lever 262. This lever 262 is pivoted on the frame 261 and is provided at its other end with a pin 265 which is connected to the key bar 255 which is positioned by depression of one of the value keys 236, the position of the bar 255 depending upon which of the value keys is depressed. Where a value key is depressed, the lever 262 is rocked on its pivot, raising the pin 278 and consequently raising the arm 276 to the selected angular position.

Slidably mounted in the frame 261 is a trip slide 283 which is normally held in position by the spring 286. The trip slide is provided with an inclined stepped face 288, with which a pin 282 on the arm 276 cooperates. By setting the arm 276, the pin 282 is positioned in front of the selected step of the trip slide and, rotation of the sprocket 272 causes longitudinal movement of the rack 267 and consequently moves the pin 282 toward and into contact with the trip slide 283 and moves the trip slide. The lever 291 is pivoted to the trip slide and bears intermediate its ends against the abutment 292, so that movement of the trip slide causes the lever 291 to rock and this rocking movement effects movement of the clutch control lever, with the result that the clutch is disengaged and the clutch housing is locked in full cycle position, as described in my application Serial Number 693,546.

In order that the arm 276 and the rack 267 may return to initial or neutral position upon the disengagement of the clutch, it is necessary that the latch 274 be removed from engagement with the rack. For this purpose, the latch is provided with a tail 41 over which is disposed an ear 293 on the lever 291 and, as the lever is rocked, due to the movement of the trip slide, the ear rocks the latch 274 and releases the rack, which is then returned to initial position by the spring 295. As soon as the rack is released the trip slide moves forward under the influence of the spring 286, rocking the lever 291 to normal position and permitting the latch to again engage the rack. This sometimes results in the latch stopping the rack before it has reached its neutral or initial position and one of the objects of the present invention is to provide means for holding the latch out of contact with the rack until the rack has reached initial position. This not only insures accuracy in operation of the machine, but permits the use of a lighter spring 295, since such spring is not required to return the rack under the resistance offered by the spring latch 274.

Connected to the end of the latch 274 is a second latch or holding finger 42, to which the spring 43 is connected, this spring serving to hold the latch 274 in engagement with the rack and to hold the second latch 42 in operative position. Secured to the frame 261 adjacent the latch 42 is a stud 45, which, when the latch 274 is raised, is engaged by the shoulder 46 of the second latch 42, thus holding the latch 274 in inoperative position and permitting the spring 295 to return the rack to initial position, without resistance. Means are provided for releasing the second latch 42 when the rack has reached its initial position and in the present instance this means comprises a stud 47 on the rack, which engages the second latch 42, as the rack reaches initial position, and moves the latch 42 out of engagement with the stud 45, thus permitting the spring 43 to return the latch 274 into engagement with the rack 267.

In the operation of the calculating machine it is often desirable to disable the automatic device for controlling the number of revolutions of the actuator, since in certain problems it is desirable that the number of revolutions be determined directly by the operator. This is accomplished in the present instance by positioning the selecting lever 262 in zero or neutral position. When the lever 262 is in neutral position, the pin 282 lies in front of a notch 52 on the trip slide 283, this notch being of sufficient depth that one step of movement of the pin 282 will not bring the pin into engagement with the face of the slide. Means are provided for causing the rotation of the actuator to merely oscillate the pin 282 backward and forward through one step of movement, so that for continued rotation of the actuator, the pin 282 is not brought into contact with the face of the trip slide 283. Pivoted on the frame 261 is a lever 53, one end of which is disposed under a pin 54 on the latch lever

274 and the other end of which is provided with an inclined surface 55 which is disposed at the side of the notch 52, so that it is engaged by the pin 282, upon rotation of the actuator, when the selecting lever 262 is in neutral position. Rotation of the actuator causes the rack to be moved backward one step. This backward movement of the rack is communicated to the pin 282 and backward movement of the pin 282 causes the lever 53 to be rocked on its pivot to raise the latch 274 out of engagement with the rack 267 and thereby permit the rack to return to neutral position. Therefore, when the pin 282 is in neutral position, the rack and the arm 276 merely oscillate back and forth through one step of movement and the trip slide is not moved. In Figure 2 I have shown the pin 282 disposed in front of the inclined end 55 of the lever 53, so that initial forward movement of the pin 282 will operate to release the latch 274.

The device of this invention therefore operates to remove all resistance to the retrograde movement of the rack, so that the parts are returned to initial position immediately upon the disengagement of the clutch. By removing all resistance greater insurance is offered that the spring 295 will return the rack to neutral position. Further, by the inclusion of the disabling lever 53, the automatic mechanism for determining the number of rotations of the actuator may be readily disabled.

I claim:

1. A device for controlling the number of rotations of the actuator of a power driven calculating machine comprising a trip slide, movement of which serves to effect the stopping of the actuator, a settable member adapted to move said slide, a rack arranged to move said member in a step-by-step movement toward said slide, a latch for preventing retrograde movement of the rack, means operated by the movement of the slide for disengaging the latch and means for holding the latch in disengaged position to permit retrograde movement of the rack.

2. A device for controlling the number of rotations of the actuator of a power driven calculating machine comprising a trip slide, movement of which serves to effect the stopping of the actuator, a settable member adapted to move said slide, a rack arranged to move said member in a step-by-step movement toward said slide, a latch for preventing retrograde movement of the rack, means operated by the movement of the slide for disengaging the latch and means for holding the latch in disengaged position to permit retrograde movement of the rack, means for releasing the latch as the rack reaches the end of its retrograde movement.

3. A device for controlling the number of rotations of the actuator of a power driven calculating machine comprising a trip slide, movement of which serves to effect the stopping of the actuator, a settable member adapted to move said slide, a rack arranged to move said member in a step-by-step movement toward said slide, a latch for preventing retrograde movement of the rack, means operated by the movement of the slide for disengaging the latch, a second latch for holding the first latch in disengaged position to permit retrograde movement of the rack and means on the rack adapted to engage and release the second latch on retrograde movement of the rack.

4. A device for controlling the number of rotations of the actuator of a power driven calculating machine comprising a trip slide, movement of which serves to effect the stopping of the actuator, a settable member adapted to move said slide, a rack arranged to move said member in a step-by-step movement toward said slide, a latch for preventing retrograde movement of the rack, means operated by the movement of the slide for disengaging the latch, a second latch for holding the first latch in disengaged position to permit retrograde movement of the rack and means on the rack adapted to engage and release the second latch on retrograde movement of the rack and a spring connected to the second latch for normally holding the first latch in engagement with the rack.

5. A device for controlling the number of rotations of the actuator of a power driven calculating machine comprising a trip slide, movement of which serves to effect the stopping of the actuator, a settable member adapted to move said slide, a rack arranged to move said member in a step-by-step movement toward said slide, a latch for preventing retrograde movement of the rack, means operated by the movement of the slide for disengaging the latch, a second latch for holding the first latch in disengaged position to permit retrograde movement of the rack, a spring for holding the second latch in position and a projection on the rack adapted to engage and release the second latch on retrograde movement of the rack.

6. A device for controlling the number of rotations of the actuator of a power driven calculating machine comprising a trip slide, movement of which serves to effect the stopping of the actuator, a settable member adapted to move said slide, a rack arranged to move said member in a step-by-step movement toward said slide, a latch for preventing retrograde movement of the rack, means operated by the movement of the slide for disengaging the rack, a second latch connected to the end of the first latch, an abutment adapted to be engaged by the second latch to hold the first latch in disengaged position and means on the rack for disengaging the second latch from the abutment.

7. A device for controlling the number of rotations of the actuator of a power driven calculating machine comprising a trip slide, movement of which serves to effect the stopping of the actuator, a settable member adapted to move said slide, a rack arranged to move said member in a step-by-step movement toward said slide, a latch for preventing retrograde movement of the rack, means operated by the movement of the slide for disengaging the rack, a second latch connected to the end of the first latch, an abutment adapted to be engaged by the second latch to hold the first latch in disengaged position and a spring arranged to hold the second latch in contact with the abutment and return the first latch into engagement with the rack when the second latch is released from the abutment.

8. A device for controlling the number of rotations of the actuator of a power driven calculating machine, comprising a trip slide, a lever adapted to be moved by said slide, movement of said lever serving to effect the stopping of the actuator, a settable member adapted to move said slide, a rack arranged to move said member in a step-by-step movement toward said slide, a latch for preventing retrograde movement of the rack, movement of the lever serving to disengage the latch and means for holding the latch in disengaged position to permit retrograde movement of the rack.

9. A device for controlling the number of rotations of the actuator of a power driven calculating machine, comprising a trip slide, a lever adapted to be moved by said slide, movement of said lever serving to effect the stopping of the actuator, a settable member adapted to move said slide, a rack arranged to move said member in a step-by-step movement toward said slide, a spring opposing said movement, a latch for preventing the spring from returning the rack, means operative by the movement of the lever for disengaging the latch, means for holding the latch in disengaged position and means operative on the return movement of the rack for releasing said holding means.

10. A device for controlling the number of rotations of the actuator of a power driven calculating machine comprising a trip slide, a spring normally holding the slide against movement, means operated by the movement of the slide for stopping the actuator, a rack adapted to be moved in a step-by-step movement, means connected to the rack for moving said slide, a spring tending to hold the rack in normal position and for returning it to normal position, a spring pressed latch for preventing return movement of the rack, means operative by the movement of the slide for disengaging said latch and means for holding the latch in disengaged position.

11. A device for controlling the number of rotations of the actuator of a power driven calculating machine, comprising a trip slide, a spring normally holding the slide against movement, means operated by the movement of the slide for stopping the actuator, a settable device associated with the slide, means operated by the actuator for moving said settable device in a step-by-step movement toward said slide and to move said slide, a latch normally preventing retrograde movement of said settable means, means operated by the movement of the slide for releasing said latch, and means for holding the latch in released position.

12. A device for controlling the number of rotations of the actuator of a power driven calculating machine, comprising a trip slide, a spring normally holding the slide against movement, means operated by the movement of the slide for stopping the actuator, a settable device associated with the slide, means operated by the actuator for moving said settable device in a step-by-step movement toward said slide, and to move said slide, a latch normally preventing retrograde movement of said settable means, means operated by the movement of the slide for releasing said latch, means for holding the latch in released position and means operated by the retrograde movement of the settable means for releasing said holding means.

13. A device for controlling the number of rotations of the actuator of a power driven calculating machine, comprising a trip slide having a stepped face, movement of said slide serving to effect the stopping of the actuator, an angularly adjustable member associated with the stepped face of the slide, a rack connected to said member, means for moving said rack in a step-by-step movement to move said member into contact with said face and move said slide, a latch for preventing retrograde movement of the rack, means operated by the movement of the slide for disengaging said latch, and means for holding the latch in disengaged position to permit retrograde movement of the rack.

14. A device for controlling the number of rotations of the actuator of a power driven calculating machine, comprising a trip slide having a stepped face, movement of said slide serving to effect the stopping of the actuator, an angularly adjustable member associated with the stepped face of the slide, a rack connected to said member, means for moving said rack in a step-by-step movement to move said member into contact with said face and move said slide, a latch for preventing retrograde movement of the rack, means operated by movement of the slide for disengaging said latch, a second latch for holding the first latch in disen-

gaged position and means on the rack adapted to engage and release the second latch on retrograde movement of the rack.

15. A device for controlling the number of rotations of the actuator of a power driven calculating machine, comprising a trip slide, movement of which serves to effect the stopping of the actuator, means for moving said slide including a rack which is moved backward one step for each rotation of the actuator, a latch for normally preventing return movement of the rack, and means actuated by movement of the rack for disabling the latch.

16. A device for controlling the number of rotations of the actuator of a power driven calculating machine, comprising a trip slide, movement of which serves to effect the stopping of the actuator, means for moving said slide including a rack which is moved backward one step for each rotation of the actuator, a latch for normally preventing return movement of the rack, means actuated by forward movement of the rack for releasing the latch to permit return movement of the rack, means for holding the latch in released position and means operative by the return movement of the rack for releasing the holding means.

17. A device for controlling the number of rotations of the actuator of a power driven calculating machine comprising a trip slide, movement of which serves to effect the stopping of the actuator, a settable member associated with said slide and adapted to be moved into contact with and move said slide, said member being settable into a plurality of numerical positions and at zero position, a rack connected to said member adapted to be moved in a step-by-step movement by rotation of the actuator, a latch normally engaging said rack to prevent retrograde movement thereof and a lever having one end disposed adjacent the zero position of the slide and the other end associated with said latch whereby the first step movement of the rack causes the settable member to engage the lever to disengage said latch.

18. A device for controlling the number of rotations of the actuator of a power driven calculating machine, comprising a trip slide, movement of which serves to effect the stopping of the actuator, a settable member associated with said slide and adapted to be moved into contact with and move said slide, said member having a neutral position, a rack connected to said member, means operated by the rotation of the actuator for moving the rack one step for each rotation of the actuator, a latch for preventing retrograde movement of the rack and means associated with the member in the neutral position and with the latch arranged to disengage the latch upon the first step movement of the rack.

19. A device for controlling the number of rotations of the actuator of a power driven calculating machine comprising an element, movement of which serves to effect the stopping of the actuator, a member adapted to move said element, said member being moved in a step-by-step movement toward said element by rotation of the actuator, a latch for preventing retrograde movement of the member, means operative by the movement of the element for disengaging the latch and means for holding the latch disengaged to permit retrograde movement of the member.

20. A device for controlling the number of rotations of the actuator of a power driven calculating machine comprising an element, movement of which serves to effect the stopping of the actuator, a member adapted to move said element, said member being moved in a step-by-step movement toward said element by rotation of the actuator, a latch for preventing retrograde movement of the member and means operated by the first step of movement of the member for disengaging the latch therefrom.

In testimony whereof, I have hereunto set my hand.

CARL M. F. FRIDEN.