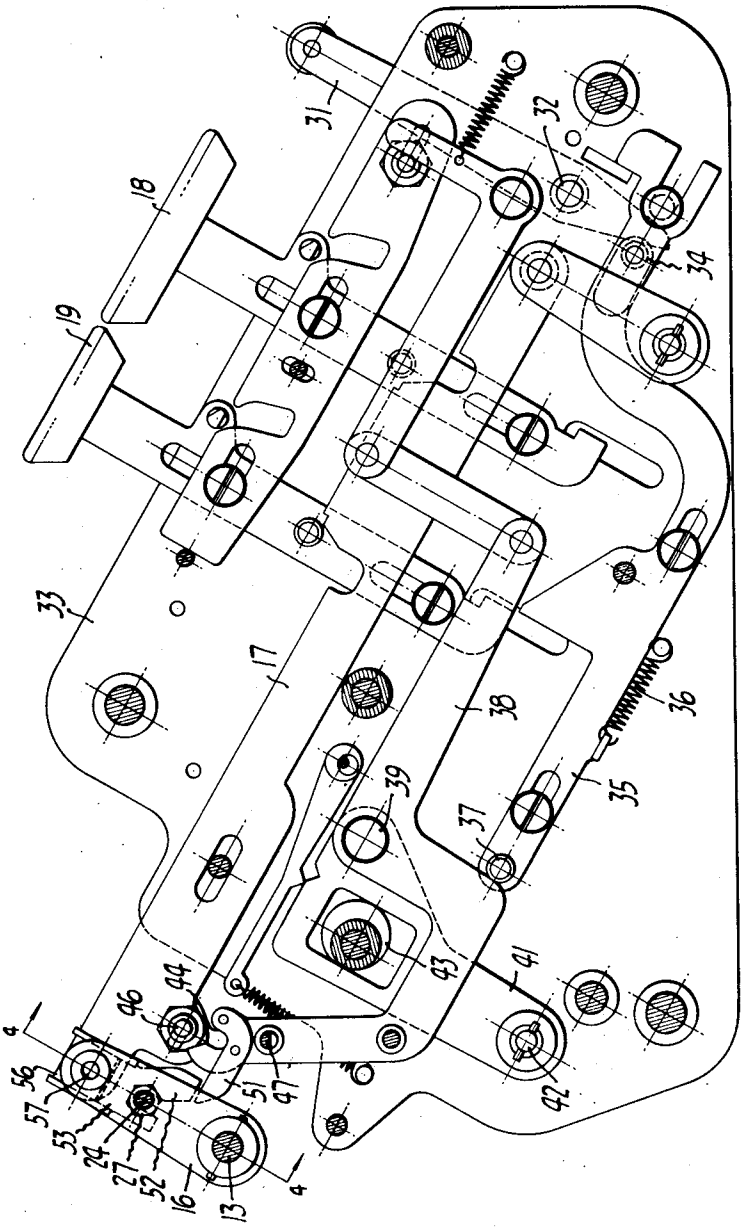
April 14, 1942. J. L. MOODY 2,279,481

CALCULATING MACHINE

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FIG. 1



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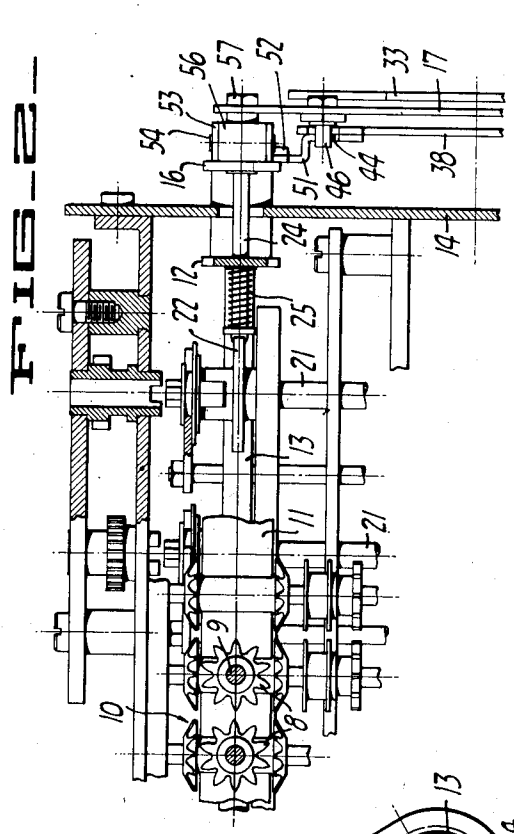


FIG. 2.

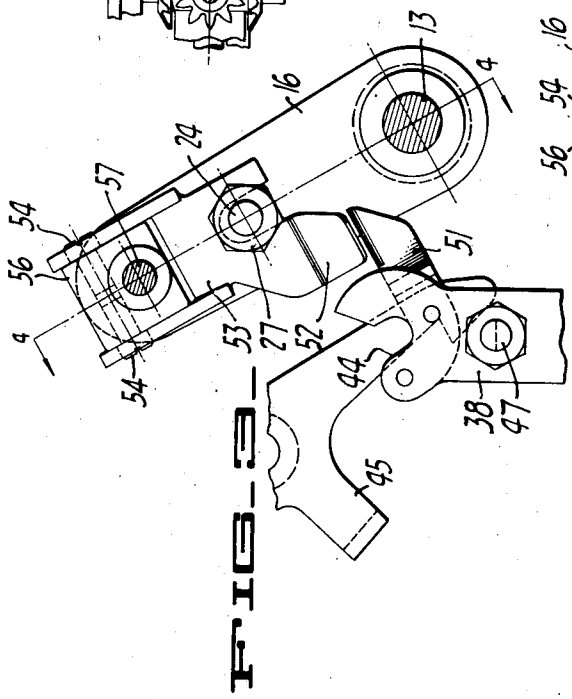


FIG. 3.

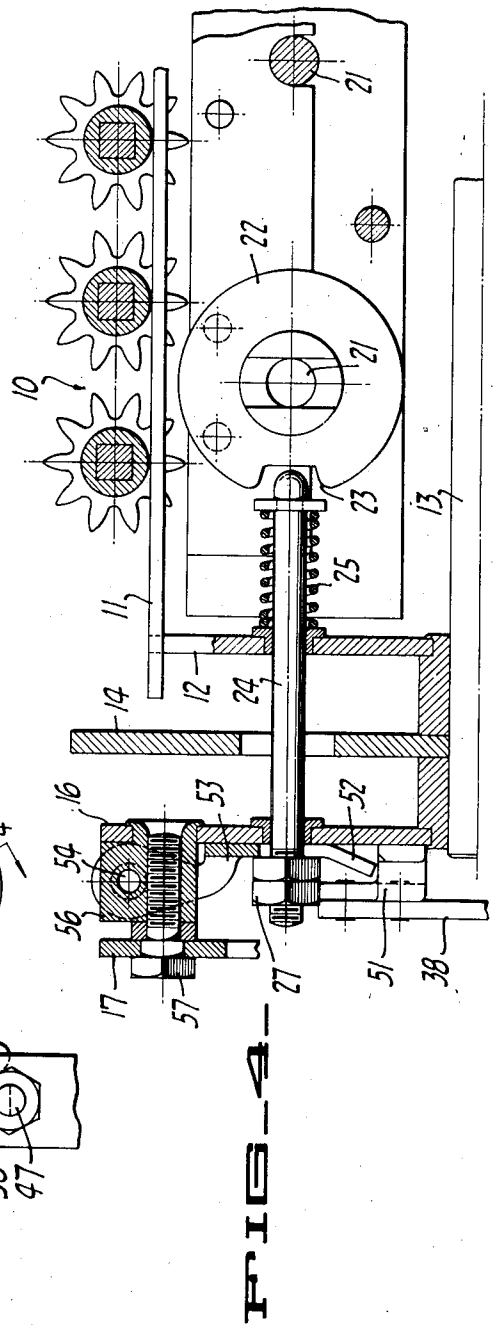


FIG. 4.

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UNITED STATES PATENT OFFICE

2,279,481

CALCULATING MACHINE

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Application December 16, 1940, Serial No. 370,291

4 Claims. (Cl. 235—75)

This invention relates to calculating machines and is concerned more particularly with the provision of an improved control means for releasing the full cycle lock in automatically controlled operations such as division operations.

It is an object of the invention to provide an improved full cycle lock disabling means.

Another object of the invention is the provision of improved means for disabling the full cycle lock mechanism during automatic operation when the lock is not required whereby closer timing of the full cycle lock mechanism can be employed.

Other objects and advantages of the invention will be apparent from the following description of a preferred embodiment thereof, as illustrated in the accompanying drawings, in which:

Figure 1 is a sectional elevational view of part of the control mechanism of a calculating machine;

Figure 2 is a fragmentary plan view partially in section illustrating the relation of the full cycle lock to a portion of the actuating means;

Figure 3 is an enlarged elevational view of a part of the full cycle lock disabling means;

Figure 4 is an enlarged sectional view of the full cycle lock mechanism taken as indicated by the line 4—4 in Figures 1 and 3.

In cyclically operable calculating machines generally and especially with those of the "Thomas" type, as selected for illustration herein, the effective number of degrees in a complete revolution which can be employed, is controlled by the timing of the full cycle lock mechanism. Particularly at the end of the cycle, the time at which the full cycle lock mechanism becomes ineffective limits the number of transfer orders which can be employed in the machine, and the later in the cycle that the lock becomes ineffective the greater the number of transfer orders. In Thomas type machines embodying division mechanism of the character shown in the above mentioned Friden patent and application, the shifting between positive and negative settings of the plus-minus gate occurs during continuous operation of the actuating mechanism. As a result the full cycle lock mechanism must change its conditioning from positive to negative and vice versa "on the fly." Consequently, when the lock is of the character employing a disc having a notch through which the locking pin passes, the notch must be of considerable extent to allow passage of the pin while the disc is turning. The necessity for this substantial clearance is avoided when the full cycle lock is disabled during division when, because of the automatic control of the position of the plus-minus gate, operation of the full cycle lock is not required. Consequently, by eliminating the operation of the full cycle lock in division, the width of the notch can be substantially decreased and correspondingly the number of useful degrees in the cycle of operation can be increased. This enables the provision of additional transfer orders in the machine.

In the embodiments selected for illustration, the present invention is shown as adapted to a calculating machine of the well-known "Thomas" type, as shown for example in the copending applications of Carl M. Friden, Ser. No. 724,482, filed May 8, 1934 (U. S. Letters Patent 2,229,889 issued January 28, 1941), and Ser. No. 35,619, filed August 10, 1935. Generally, such machines comprise a uni-directionally operable actuating means by means of which values are introduced in the register either positively or negatively by the setting of a conventional form of plus-minus gears. A portion of the register comprising numeral wheel gears 8 and shafts 9 is shown in Figure 2. The plus-minus gears are indicated at 10 in Figures 2 and 4. The setting of the gears back and forth from a central neutral position is controlled by means of a strap 11 which engages the gears to effect shifting movement thereof and is mounted by means of a plurality of arms 12 on a rockable shaft 13. Shaft 13 also carries exteriorly of one of the side frame plates 14 a control arm 16. The arm 16 is shown in Figure 1 in its central neutral position where the plus-minus gears are disengaged from the associated numeral wheel gears. For effecting rocking movement of the arm 16 and shaft 13 from the position as shown in Figure 1, the arm 16 is connected to a plus-minus slide 17 which is mounted for endwise movement in either direction under the control, for example, of the plus and minus keys 18 and 19.

In order to insure completion of a registration during a cycle of movement of the actuating means, full cycle lock mechanism is provided for holding the plus-minus gears in adjusted position until the end or until near the end of the cycle, one of the actuating shafts 21 (Figures 2 and 4) is provided with a locking disc 22 which, as seen in Figure 4, has a cutaway portion 23. Figure 4 illustrates the full-cycle position of the parts. Cooperating with the cutaway portion 23 is a spring-urged locking pin 24 having a rounded end disposed within the cutaway portion 23 in the central neutral position of the plus-minus

gears. Pin 24 is slidably mounted in suitable bushings in arms 12 and 16 and is urged to active position by spring 25. Pin 24 yields by compression of spring 25 if the disc 22 is rotated with the plus-minus gears in such neutral position.

Upon setting of the plus-minus gears in either direction from their central neutral position, pin 24 has its nose disposed to one side or the other of the disc 22, and upon subsequent operation of the actuating means and the rotation of shaft 21 and disc 22 retains the plus-minus gears in rocked position until the notched portion 23 of disc 22 again reaches its full cycle position.

The pin 24 is slidably mounted in arms 12 and 16 as explained above and is provided at its rearward end with adjustable stop nuts 27.

A suitable form of division control mechanism is provided in the machine including a manually operable division starting key or lever 31 which is pivoted at 32 on the frame plate 33 and engages at its lower end the roller 34 on a division setting slide 35. Slide 35 is mounted for endwise movement and can be moved from the position shown in Figure 1 against the urgency of its spring 36. The pin 37 carried by the slide 35 engages a setting or connecting lever 38 of the division control mechanism. Lever 38 is pivoted at 39 on a cam follower arm 41 pivoted at 42 on the frame plate 33 and engaging a division controlling cam 43. Cam 43 operates in a known manner during division to control the position of the arm 41 and connecting lever 38.

Upon movement of the division lever 31 in a clockwise direction from the position shown in Figure 1, it operates through the slide 35 to rock connecting lever 38 in the clockwise direction from the position shown in Figure 1. Such rocking movement of the connecting lever 38 serves to engage its notched end 44 with pin 46 on the plus-minus slide 17. The parts are latched in this position by means of a suitable latch lever 45 (Figure 3) engaging pin 47 on connecting lever 38. This mechanism is conventional and is shown in the above mentioned applications.

Means are provided under control of the division setting control means to disable the full cycle lock during the division operation. The bell crank connecting lever 38 carries a cam extension 51 (Figures 3 and 4) having a bevelled face for operative engagement with a cam end 52 of a fork 53. Fork 53 is pivotally mounted on pins 54 carried by spacer 56 mounted on pivot pin 57 which provides the connection between arm 16 and the plus-minus slide 17. The forked portion of the member 53 engages the adjusting nuts 27, so that upon upward movement of the cam end 51, fork 53 is rocked in a clockwise direction as viewed in Figure 4 to move pin 24 against the urgency of its spring 25 until its end is withdrawn from the notched portion 23 of the full cycle lock disc 22. This condition of the part obtains as long as the division control mechanism is latched in position by means of the latch lever 45 and pin 47 (Figure 1). At the end of the division operation latch lever 45 is disabled in any convenient manner, for example as shown in said applications. In this manner connecting lever 38 and cam extension 51 move downwardly to release fork 53 and full cycle lock pin 24.

I claim:

1. In a calculating machine having a register and actuating means therefor, full cycle lock mechanism for insuring complete registration during each cycle on said numeral wheels by said actuating means, said lock mechanism including a notched locking disc driven in time with said actuating means and a spring-urged locking member having a portion disposed in said notch in the full cycle position of said disc, said pin being movable to one side of said disc during registration on said register, a manually operable key, and means settable by said key for withdrawing said pin to render said full cycle lock mechanism ineffective.

2. In a calculating machine having a register, actuating means for said register, and settable plus-minus gears for determining positive and negative registration on said register by said actuating means, said gears being settable from a central inactive position in either direction to cause said registration selectively; a notched disc driven by a part of said actuating means, a spring-urged locking pin cooperatively related to said disc and movable to either side of said disc through the notched portion thereof in accordance with the setting of said plus-minus gears, a manually operable key, and means controlled by said key for moving said pin out of operative relation with said disc.

3. In a calculating machine having a register, actuating means for said register, settable plus-minus gears for determining positive and negative registration on said register by said actuating means, and division control mechanism including power driven cam means for controlling the setting of said plus-minus gears and a manually operable key for initiating a division operation; full cycle lock mechanism associated with said actuating means and said settable plus-minus gears and normally effective to maintain said gears in adjusted position through a complete cycle, said locking mechanism including a member spring-urged to active position, and means settable by said key for withdrawing said spring-urged member whereby to render said locking mechanism ineffective during operations initiated by said key.

4. In a calculating machine having a register, actuating means for said register, settable plus-minus gears for determining positive and negative registration on said register by said actuating means, and division control mechanism including power driven cam means for controlling the setting of said plus-minus gears and a manually operable key for initiating a division operation; full cycle lock mechanism associated with said actuating means and said settable plus-minus gears and normally effective to maintain said gears in adjusted position through a complete cycle, said locking mechanism including a member spring-urged to active position, said division control mechanism also including a member settable to active position by operation of said key, and means operated by said last-named member upon movement thereof to active position for withdrawing said spring-urged locking member.

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