Feb. 28, 1939. G. LERCH 2,148,760

CALCULATING MACHINE

Filed June 28, 1932 5 Sheets-Sheet 1

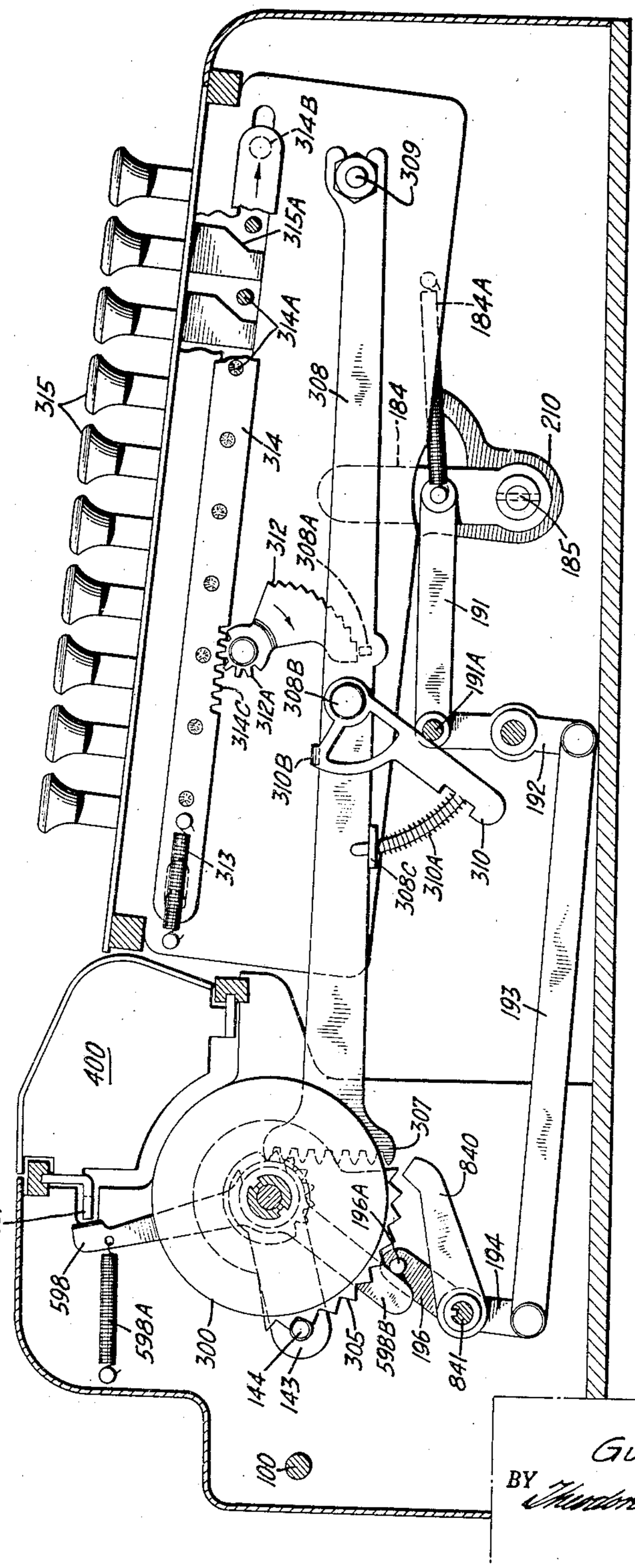

FIG. 1.

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Feb. 28, 1939. G. LERCH 2,148,760

CALCULATING MACHINE

Filed June 28, 1932 5 Sheets-Sheet 2

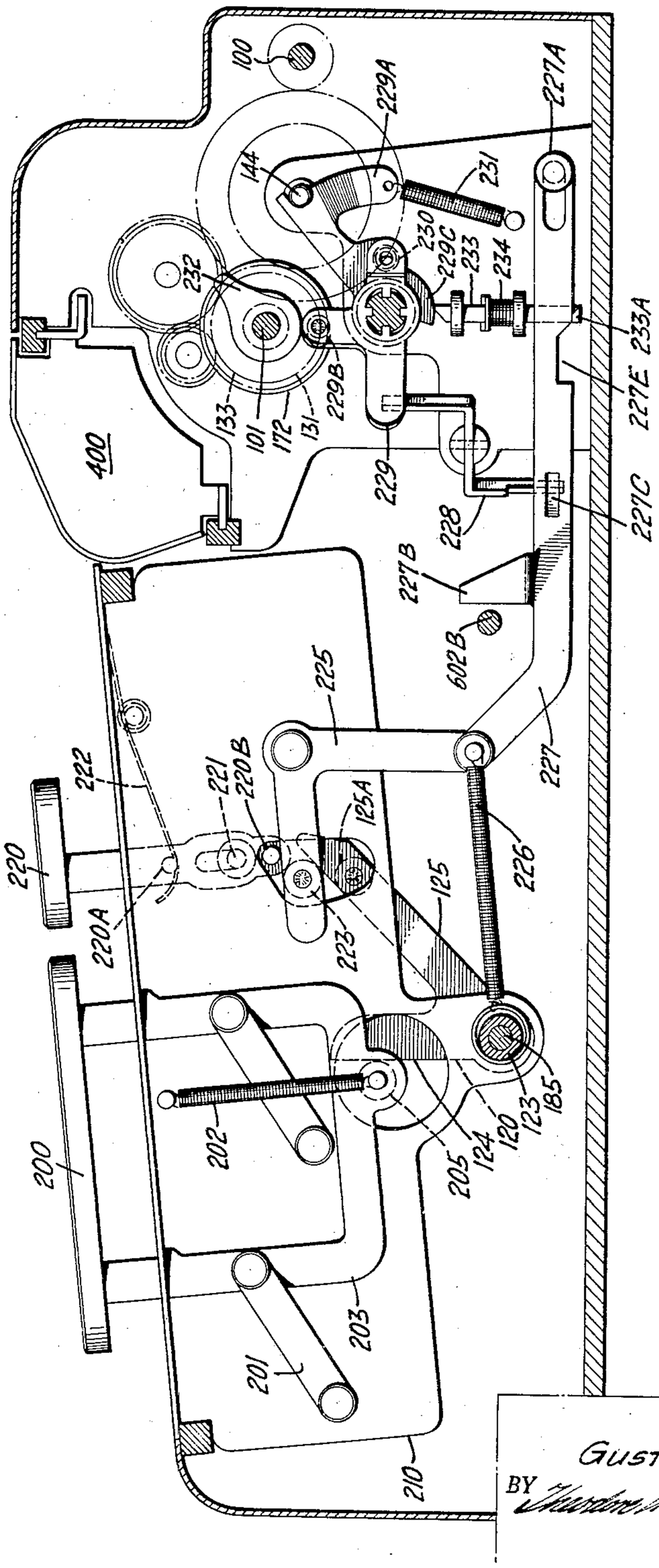

FIG. 2.

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Feb. 28, 1939. G. LERCH 2,148,760

CALCULATING MACHINE

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FIG_3_

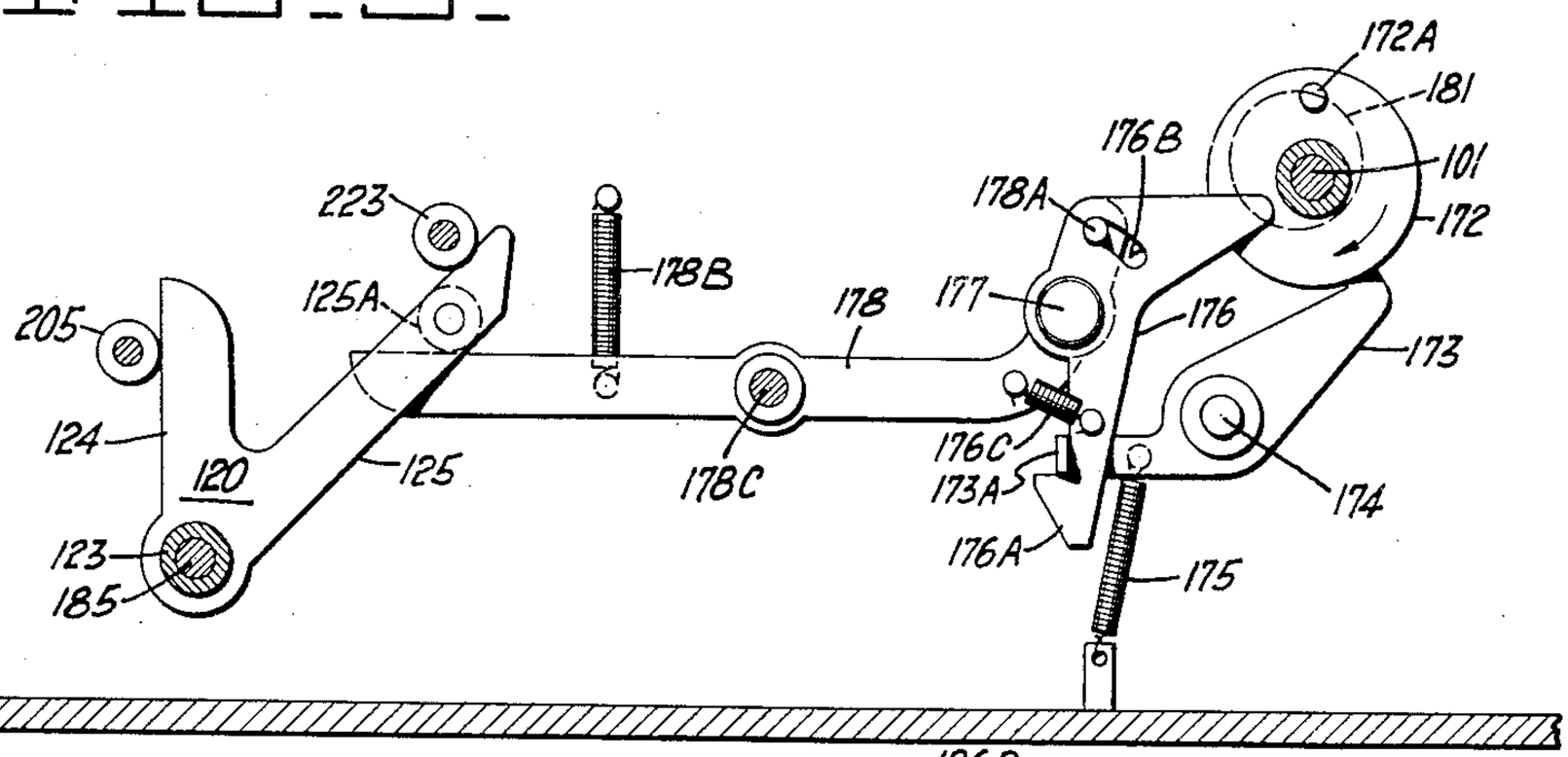


FIG_4_

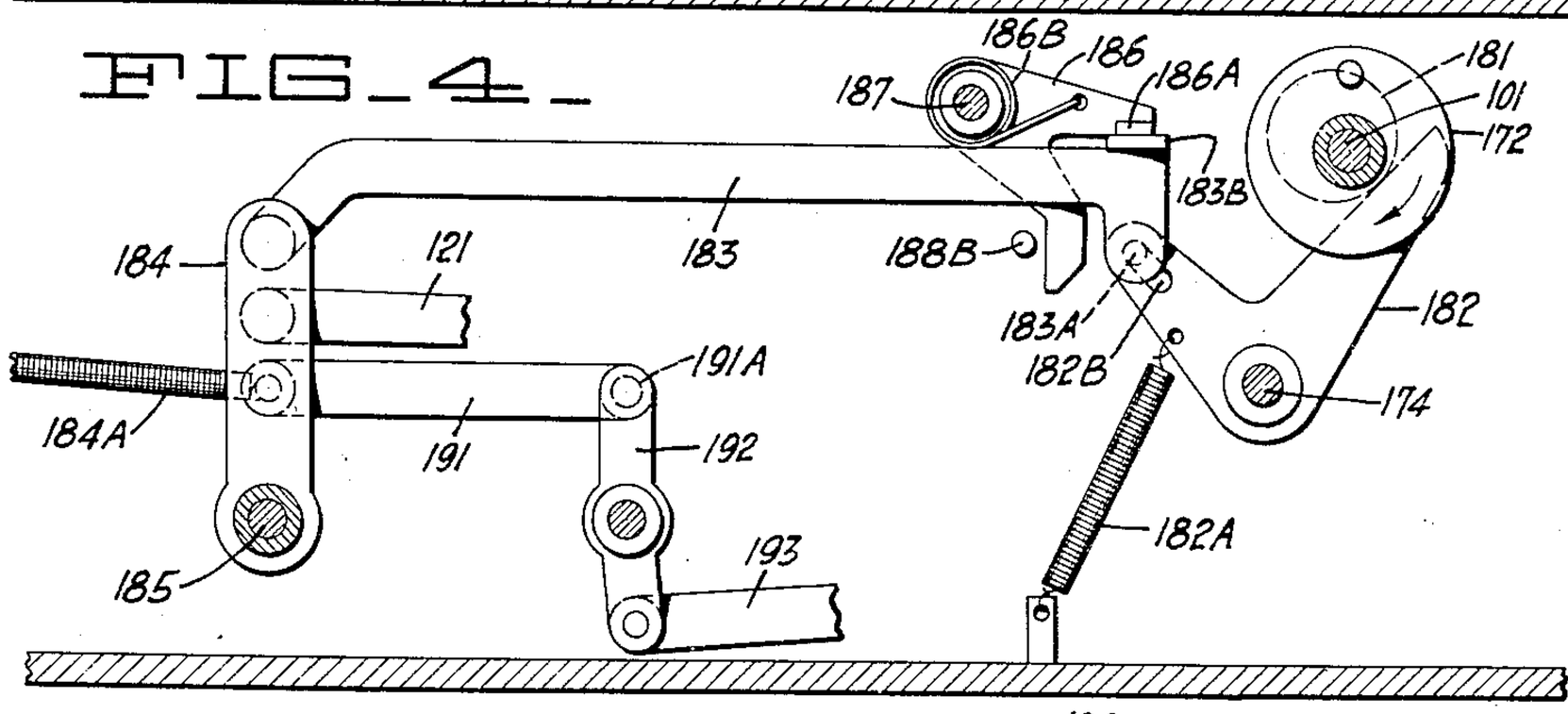
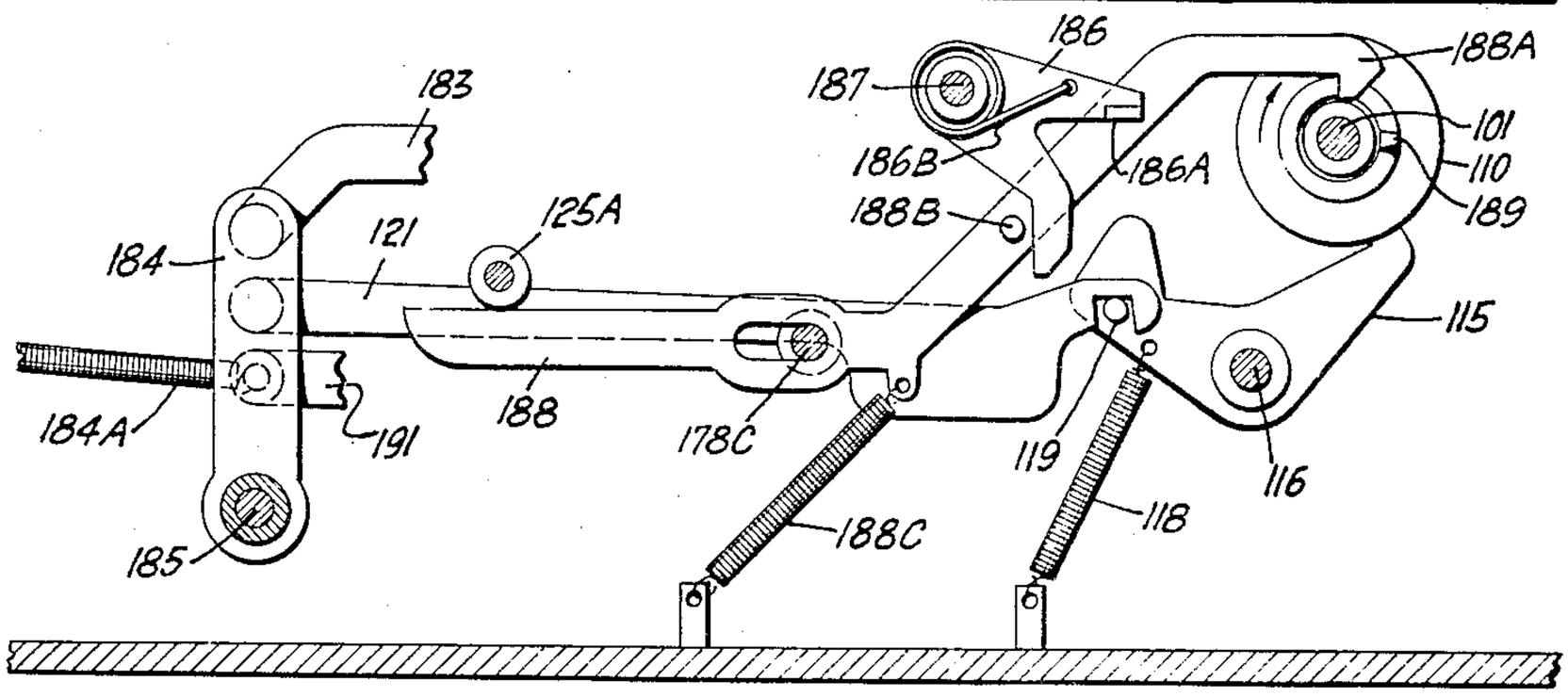


FIG_5_



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CALCULATING MACHINE

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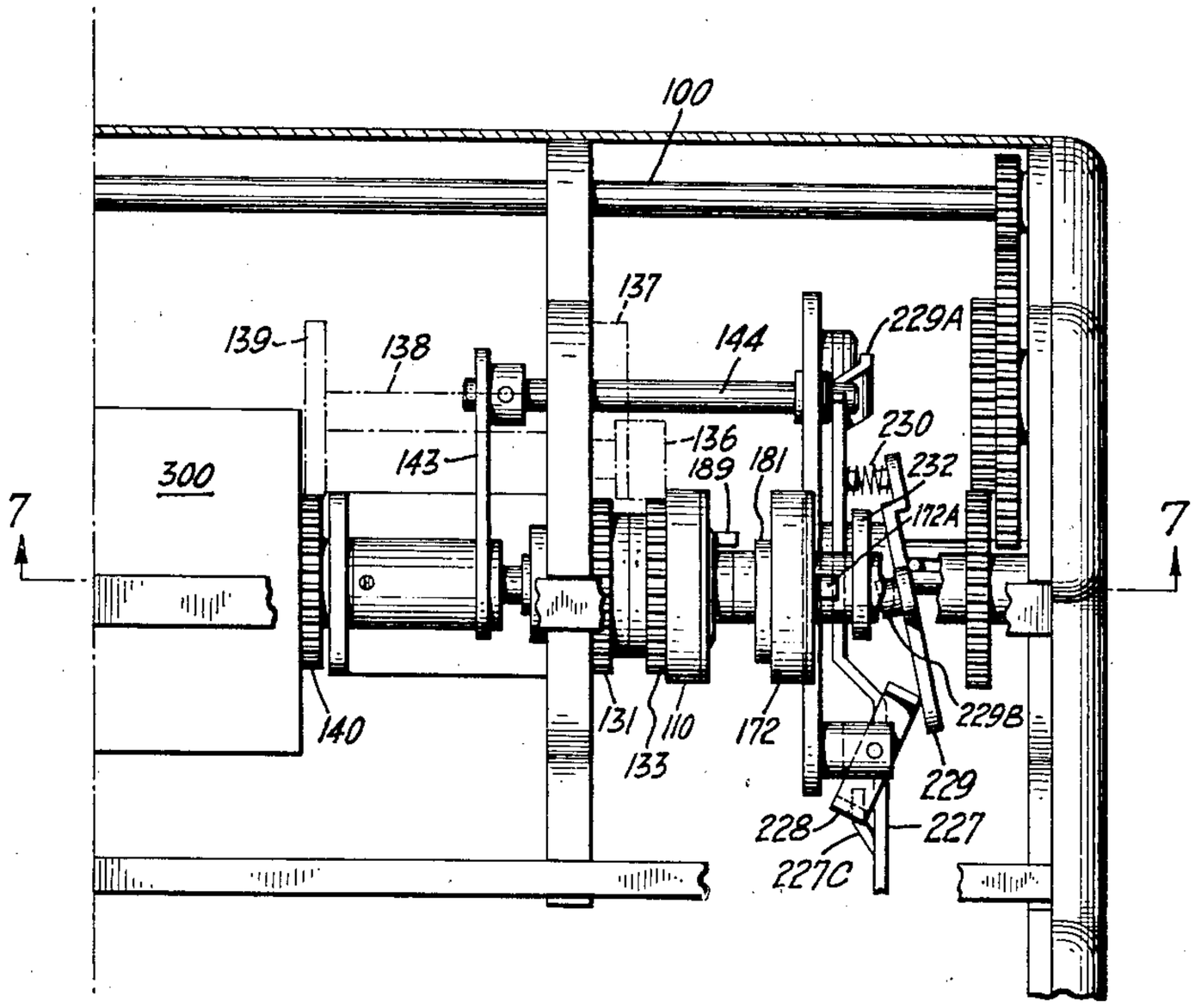
FIG. 6.



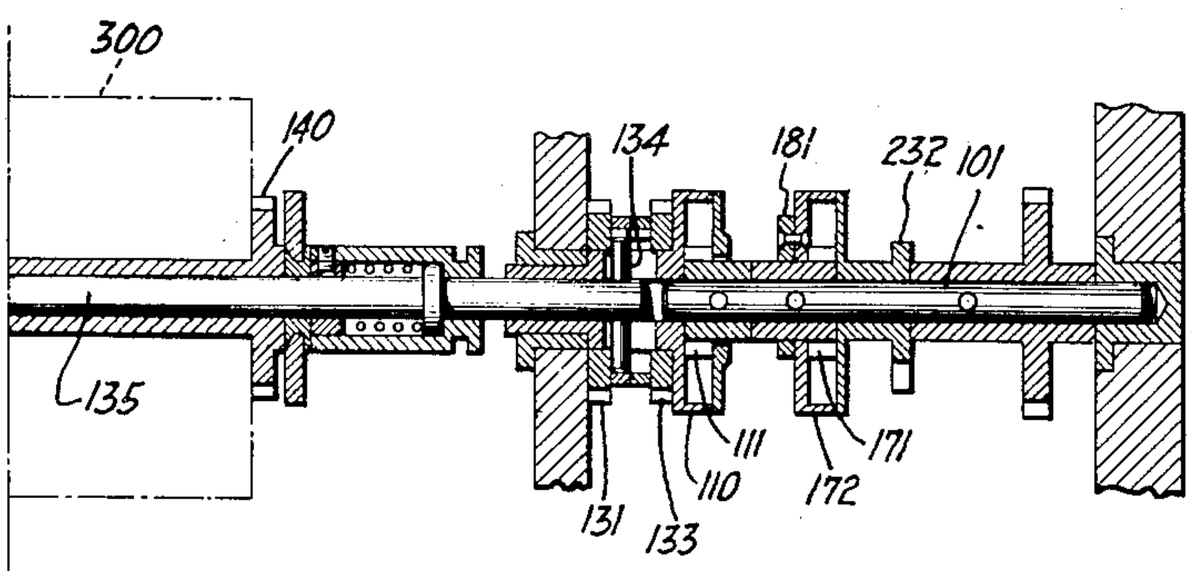


FIG. 7.

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CALCULATING MACHINE

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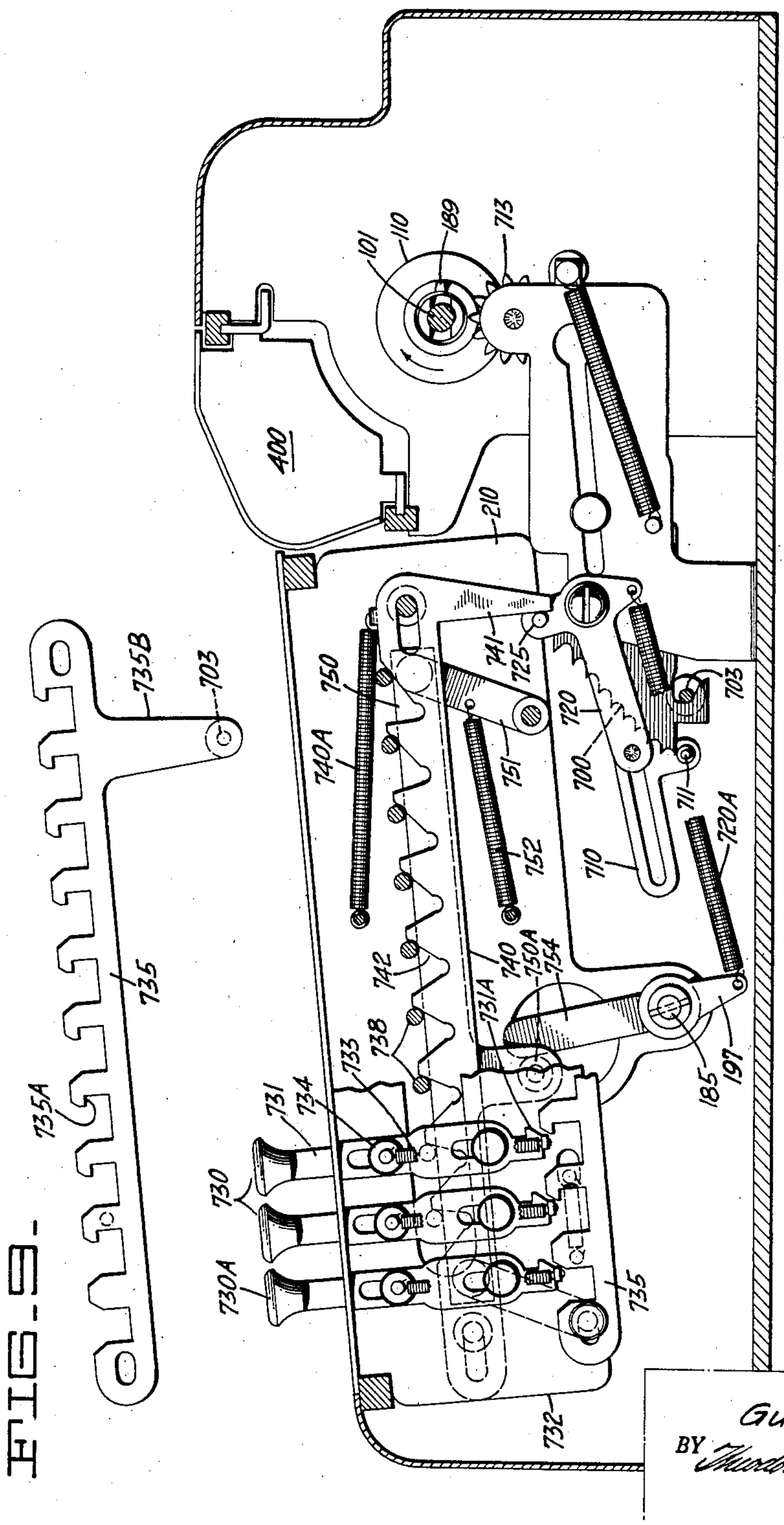

FIG-5-

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Patented Feb. 28, 1939 2,148,760

UNITED STATES PATENT OFFICE

2,148,760

CALCULATING MACHINE

Gustav Lerch, Oakland, Calif., assignor to Marchant Calculating Machine Company, a corporation of California

Application June 28, 1932, Serial No. 619,645

27 Claims. (Cl. 235—62)

The present invention relates to calculating machines of the type adapted to perform the four cardinal calculations and combinations thereof, and particularly to the type in which the transmission mechanism is controlled by a plurality of operation-controlling devices to initiate various calculations of one or more cycles of operation. The invention is concerned more particularly with auxiliary power operated means by which the various operation control devices are set and the main clutch is engaged.

It is an object of the invention to provide operation controlling mechanism which is moved to operative position by auxiliary power driven mechanism upon movement of the control devices or keys to operative position.

Another object of the invention is the provision of an auxiliary clutch the operation of which is indicated by any one of a plurality of manually operable controlling devices to selectively engage and set the various machine function controls to operative position.

Another object of the invention is the provision of an auxiliary clutch adapted to determine engagement of the main clutch and to set the various auxiliary controlling mechanisms.

Another object of the invention is the provision of power driven means for transferring a keyboard selection into the actuator.

Another object of the invention is the provision of power driven means for locking the selection in the actuator.

Another object of the invention is the provision of power driven means for setting a multiplier selection into the multiplier control unit under the control of a plurality of multiplier selection keys.

Another object of the invention is the provision of an auxiliary clutch which is adapted to determine engagement of the main actuating clutch upon operation of any operation determining key.

Another object of the invention is the provision of an auxiliary clutch for setting reversing gearing to determine negative actuation of the numeral wheels by the actuator.

Another object of the invention is the provision of power operated means for enabling interlocking mechanism.

Other objects will appear as this description progresses.

The machine embodying the present invention is of the general type shown in the patent to Friden, Number 1,643,710 dated September 27, 1927, to which reference is hereby made for a disclosure of a complete calculating machine including mechanism not specifically described herein. It is to be understood, however, that although the invention is shown applied to a machine of the general type disclosed in this patent, it is manifest that the invention is applicable in any machine which is power driven and in which various controlling mechanisms must be set at the beginning of a selecting operation.

The invention possesses a plurality of advantageous features, some of which will be set forth in full in the following description, and while the preferred construction thereof is shown in the drawings accompanying the description, it is understood that the invention is capable of modification within the scope of the appended claims.

In the accompanying drawings:

Figure 1 is a left side elevation showing the numeral keys, the selection mechanism controlled thereby, the actuator, and the locking mechanism whereby the selection set into the actuator is locked therein.

Figure 2 is a right side elevation showing the plus and minus keys and the mechanism which positions the reversing gearing control.

Figure 3 is a detail view showing the means for engaging the auxiliary clutch upon operation of any operation initiating member.

Figure 4 is a detail view showing the means whereby the auxiliary clutch operates to set various control mechanisms.

Figure 5 is a detail view showing the mechanism for controlling engagement of the main actuating clutch.

Figure 6 is a partial plan view showing the actuator and the driving mechanism therefor.

Figure 7 is a section taken on the line 7—7 in Figure 6.

Figure 8 is a longitudinal section through the multiplier mechanism showing the multiplier selection mechanism and the multiplier control unit.

Figure 9 is a detail view of the latching slide for maintaining a multiplier key in depressed position for a predetermined number of operating cycles.

Driving Mechanism

The machine is provided with a motor (not shown) which drives shaft 100 (Figures 2 and 6), the drive from said shaft being transmitted by suitable gearing to drive shaft 101. Mounted on said drive shaft is a ratchet wheel 111 (Figure 7) which constitutes the driving member of the main clutch 110. Also secured to said drive shaft 101 is a second ratchet wheel 171 which constitutes the driving member of the auxiliary clutch 172.

The specific constructions of said clutches are identical and are fully disclosed in the aforementioned patent to Friden to which reference is hereby made for a complete disclosure of the same. For the purposes of the instant description, it is sufficient to understand that in this type of clutch the clutch housing constitutes the driven member and that the engagement of the clutch is controlled by a bellcrank which is adapted to be engaged or disengaged from the clutch housing, thereby controlling movement of a pawl adapted to connect the housing and the ratchet wheel to effect the drive. As shown in Figure 5 the engagement of the main clutch 110 is controlled by a bellcrank 115 which is pivoted at 116 and is urged into clutch disengaging position by the spring 118. As shown in Figure 3, a similar bellcrank 173 controls engagement of the auxiliary clutch 172, said bellcrank being pivoted at 174 and urged into clutch disengaging position by spring 175 tensioned between the tail of said bellcrank and an ear on the base plate. The mechanism for controlling the engagement and disengagement of the respective clutches will be more fully described hereinafter.

Suitable reversing gearing is interposed between the clutch 110 and the actuator 300. Gears 131 and 133 (Figures 6 and 7) serve to transmit rotation from the clutch housing to the actuator according to the desired direction of rotation. The gear 131 drives through gear 137, shaft 138, gears 139 and 140 to rotate said actuator in the additive direction, while the gear 133 drives through gears 136, 137, shaft 138, gears 139 and 140 to rotate said actuator in the subtractive direction. The drive from the clutch housing to the respective gear is transmitted by a pin 134 (Figure 7) which is secured to a shaft 135 and is shiftable into a seat in either of the respective gears 131 and 133. The ends of said pin extend through slots in a collar formed integrally with the clutch housing 110 into the seat of the gear with which the pin is aligned. A suitable shifting fork 143 is provided for shifting said pin from the seat in one gear to the seat in the other, said pin being normally disposed within the seat of the gear 131 in position to drive said actuator in an additive direction. The controlling mechanism whereby fork 143 is shifted to shift pin 134 to determine subtractive or additive actuation, will be described hereinafter under the heading of Reversing mechanism control.

Auxiliary Clutch and Associated Mechanism

Control mechanism

As previously described the auxiliary clutch 172 (Figure 3) is controlled by the bellcrank 173 pivoted at 174. Said bellcrank is provided on the forward end thereof with a lateral extension 173A which overlies the nose 176A formed on the lower end of a lever 176 pivoted at 177 to a lever 178 and having a limited oscillatory movement with respect thereto due to the engagement of pin 178A on lever 178 with slot 176B formed in the upper arm of lever 176. Spring 176C tensioned between lever 176 and 178 tends to rock lever 176 to its furthermost clockwise position with respect to lever 178 as shown in Figure 3. The forward arm of lever 178 underlies a roller 125A on the inclined arm 125 of control plate 120 being maintained in engagement therewith by spring 178B tensioned between lever 178 and a stud on an intermediate supporting plate. Control plate 120 is rocked in a clockwise direction upon operation of any operation initiating key and the arrangement is such that roller 125 oscillates lever 178 which, by means of lever 176, rocks the clutch release bellcrank 173 to clutch engaging position.

Means are provided whereby the auxiliary clutch is engaged for a single rotation only; said means comprises a pin 172A integral with the clutch housing which, during the first rotation of said clutch, strikes the under side of the upper arm of lever 176, rocking said lever against the tension of spring 176C to disengage nose 176A from the tail 173A of the bellcrank 173. Spring 175 then becomes effective to press the nose on said bellcrank against the clutch housing until the end of the rotation when it enters the notch therein, thereby serving to disengage the clutch. From the foregoing it is evident that the auxiliary clutch 172 is engaged for a single rotation upon operation of any control key.

Means are provided whereby operation of the auxiliary clutch sets all the various control mechanisms necessary for an operation and engages the main clutch. Secured to the clutch housing of clutch 172 is a cam 181 which is adapted, upon rotation of said clutch housing, to oscillate a bellcrank 182 loosely mounted on shaft 174 (Figure 4) against the tension of spring 182A secured to the forward arm of said bellcrank and a pin on the base plate. The forward arm of said bellcrank is slotted at 182B to receive a pin 183A on the rearward end of a link 183, the forward end of said link being secured to an arm 184, the lower end of which is secured to shaft 185, said shaft being disposed within the tubular shaft 123. The arrangement is such that clockwise oscillation of bellcrank 182 moves link 183 rearwardly and oscillates arm 184 and shaft 185 in a clockwise direction, such oscillation being used to perform various functions, as will be hereinafter set forth.

Means are provided whereby the clockwise oscillation of link 183 and arm 184 serves to engage the main clutch. As shown in Figure 5, a link 121 is pivoted at its forward end to arm 184 and is notched at its rearward end to engage a pin 119 on the clutch release bellcrank 115 so that rearward movement of link 121 results in oscillation of clutch release bellcrank 115 to clutch engaging position. It is to be noted that the notch in member 121 is of sufficient width to provide a certain amount of lost motion beween link 121 and the clutch release bellcrank 115 in order to provide ample time for the setting of other mechanisms before engagement of the main clutch.

Means are provided for latching the main clutch engaging means in active position until the end of the operation determined by the operated control means. Said means comprises a latching member 186 pivoted at 187, a lateral extension 186A on the upper arm thereof being adapted to drop behind lateral extension 183B on link 183 under the influence of spring 186B when said link is moved rearwardly.

Means are provided for disabling the above described latching means at the conclusion of the operation determined by the operated control key. Roller 125A on control plate 120 (Figures 3 and 5) overlies the forward arm of a lever 188 which is pivoted on shaft 178C by means of an elongated slot as shown and which is provided with a nose 188A at the rearward end thereof which is held in engagement with a single tooth gear 189 by a spring 188C. Upon operation of any control key, member 188 is rocked by roller 125A to remove the nose 188A thereof from the path of the single tooth gear 189 which is secured to the housing of clutch 110. Upon release of the

operated control key spring 188C becomes effective to move nose 188A into the path of the tooth on gear 189 which imparts a rearward movement to member 188 whereby a pin 188B secured thereto and lying immediately forward of the lower arm of latching member 186 (Figures 4 and 5), rocks said latching member to inoperative position. Thus link 183 and arm 184 are released at the end of any operation of the machine and are permitted to return to normal position under the tension of springs 182A and 184A (Figure 4), whereby bellcrank 115 is moved by its spring 118 to main clutch disengaging position to stop the actuator 300.

Plus and minus keys

Manually operable means are provided for determining any desired number of positive or negative actuations of the accumulating mechanism by the actuating mechanism. The means for initiating positive actuation comprises the plus key 200 (Figure 2) which is mounted for rearward and downward movement on parallel links 201, being held in raised position by a spring 202 tensioned between a stud on said key and the supporting plate 210. The frame 203 carries a roller 205 which extends through an aperture in the plate 210 and abuts the forward vertical arm 124 of control plate 120. Due to the manner in which the frame is mounted on the parallel links, depression of the plus key causes the roller to be moved downwardly and to the rear, rocking the control plate in a clockwise direction to effect engagement of the auxiliary clutch in the manner described above.

The manual means for controlling reverse engagement of the drive for any desired number of actuations comprises a minus bar 220 slidably mounted on the intermediate plate 210 by means of pin and slot connection 221 and normally maintained in elevated position by spring 222 which underlies the stud 220A on said bar 220. Said bar carries near its lower end a pin 220B which extends through an aperture in the plate 210 and overlies a bellcrank 225 (Figure 2) which is provided on its forward arm with a roller 223 overlying the rearward inclined arm 125 of control plate 120. The arrangement is such that depression of the minu. key 220 causes clockwise oscillation of control plate 120 to engage the auxiliary clutch in the manner described above. Said minus key 220 also acts, through the bellcrank 225, to determine subtractive rotation of the actuator in the manner set forth hereinafter under the heading of Reversing mechanism control.

Automatic multiplication

A series of multiplier keys 730 (Figure 8) of differing numerical value are mounted for vertical sliding movement on pins 734 secured to an intermediate plate 732, being normally maintained in their raised position by springs 733 tensioned between the upper pin 734 and a lateral extension on the lower end of the key stem. The lower end of the key stem is provided with a nose 731A which is adapted upon depression of the key to cam a latching slide 735 to the right and thereafter to be positioned beneath a nose 735A on said slide to maintain the key in depressed position during the operation determined thereby. The key 730A at the forward end of the bank of keys 730 is a clearance key and its function is to move the slide 735 to cause the release of any key 730 which may be held depressed.

Means are provided whereby depression of any multiplier key sets a value into the multiplier control unit corresponding to the value of the depressed key. Each key stem 731 is provided with a laterally extending pin 738 which overlies a camming notch in the differential bar 740 which is slidably mounted on the plate 732 (Figure 8). The slide 740 is moved longitudinally to different differential positions upon the depression of one of the keys 730 due to the differing inclinations of notches 742 formed in the upper surface of said slide. The opposite sides of each notch are complementally inclined to cause proper movement of the slide upon depression of a key, regardless of the prior position of said slide, while the bottom of each notch is formed into a socket adapted to receive the pin 738 to accurately position the slide. The slide 740 is normally maintained in its forward position by a spring 740A tensioned between a stud on plate 732 and a lateral extension on the rearward end of said slide.

The slide 740 is provided at its rearward end with a downward extension 741, the forward edge of which is adapted to form a stop for a pin 725 on the upper arm of bellcrank lever 720. As shown in Figure 8, the slide and lever 720 are in their zero position and upon depression of any multiplier key 730, slide 740, and extension 741 are moved rearwardly from the zero position a distance corresponding to the value of the depressed key. Bellcrank 720 is rocked in a clockwise direction by means to be hereinafter described, and pin 725 contacts extension 741, thereby limiting the angular movement of lever 720 to an amount corresponding to the value of the depressed key. Lever 720 and slide 710 mounted thereon, together with stepped plate 700 cooperating with said slide, form a portion of the multiplier control trip unit which is fully described in the above mentioned patent to Friden, to which reference is hereby made for a full disclosure of such mechanism.

Means are provided for engaging the auxiliary clutch upon depression of a multiplier key. Arranged at the side of slide 740 and directly below pins 738, is a bar 750 which is supported for parallel motion on links 751 and which is normally held in elevated position in contact with pins 738 by the spring 752. Due to the inclination of links 751 depression of a key 730 causes a rearward and downward movement of the bar 750 whereby roller 750A mounted on a downward extension of said bar, rocks an arm 754 which is rigidly secured to tubular shaft 123, on which control plate 120 is mounted (Figure 2) in a similar manner. Thus it is seen that clockwise movement of arm 754 on depression of a multiplier key, causes corresponding movement of control plate 120 thereby serving to engage the auxiliary clutch 172 in the manner hereinbefore described.

Means are provided whereby the auxiliary clutch sets the multiplier control unit to determine the number of actuations in accordance with the depressed multiplier key. As shown in Figure 8, an arm 197 fast to the shaft 185 is connected by spring 720A with an ear on bellcrank 720, said spring being normally free of tension. Upon clockwise movement of shaft 185 due to the rearward movement of arm 184 and link 183, arm 197 serves to tension spring 720A which then becomes effective to rock bellcrank 720 in a clockwise direction until pin 725 contacts the downward extension 741 of multiplier slide 740. This tension is maintained throughout the operation due to the latching of arm 184 and link 183

in displaced position by latching member 186. Due to the lost motion between link 121 and clutch release bellcrank 115 the multiplier selection is set into the control unit before the main clutch is engaged.

During the multiplying operation single tooth gear 189 acting through gear 713 advances slide 710 step by step as fully disclosed in the above mentioned patent, the advance taking place early in the cycle. During the last cycle of operation, pin 711 moves plate 700 rearwardly to stop the operation in the following manner. Plate 700, acting against pin 703 on downward extension 735B of latching slide 735, moves the same rearwardly to release the depressed key 730, which thereby permits a return of arm 754, shaft 123, control plate 120, to inoperative position. This action moves roller 125A (Figure 5) away from the forward arm of lever 188, thus permitting the nose 188A thereof to fall into the path of the single tooth gear 189 to be moved rearwardly by the same to release latch 186 and permit disengagement of the clutch by the bellcrank 115.

Reversing mechanism control

Means are provided for enabling auxiliary clutch operated means for setting the reversing gears to subtractive position upon depression of the minus key 220. As previously described, depression of key 220 through pin 220B rocks the bellcrank 225, said bellcrank being maintained in its normal position by spring 226 as shown in Figure 2. Secured to the lower end of bellcrank 225 is a link 227 (Figure 2) which is supported at its rearward end by a stud 227A engaging a slot formed therein.

The link 227 is provided with cam lug 227C (Figures 2 and 6) which normally holds the lower arm of lever 228 to the left as viewed in Figure 6. The upper arm of said lever 228 contacts the forwardly extending arm 229 of a two-part member 229—229A, holding the same rocked in a counter-clockwise position as shown in Figure 6, against the compression of spring 230. Parts 229 and 229A are keyed to a common shaft for simultaneous oscillation in a substantially vertical plane, but part 229 is loosely keyed thereto to permit lateral oscillation thereof on said shaft. The rearward and upwardly extending arm 229A is provided with a cam flange (Figures 2 and 6) which engages a slot in the shaft 144. One part of the cam flange is offset from the other so that oscillation of two-part member 229—229A serves to shift shaft 144 and fork 143 and reversing pin 134 to reverse the direction of drive of the actuator. The two-part member 229—229A is normally held in a position to determine additive rotation of the actuator by spring 231 as shown in Figure 2.

As shown in Figure 6, member 229—229A is held in its normal inoperative position by the cam lug 227C on link 227. Upon rearward movement of link 227 compression spring 230 becomes effective to rock the part 229 in a clockwise direction to position a roller 229B on an upward extension of said lever in the path of a cam 232 (Figures 2 and 6) formed integrally with the housing of auxiliary clutch 172. Cam 232 rotating in a clockwise direction contacts roller 229B thereby rocking two-part member 229—229A in a counter-clockwise direction whereby the cam flange formed on part 229A becomes effective to shift shaft 144, fork 143, and pin 134 to their right hand position, as viewed in Figure 7, thereby determining a subtractive drive of the actuating mechanism. As cam 232 (Figure 2) operates ahead of cam 181 (Figure 4) in the cycle of the auxiliary clutch the timing of the setting of the reversing gearing in relation to the engagement of the main clutch is such that the reversing gearing is fully set in subtractive position if such direction of drive is determined before the main clutch is engaged.

Means are provided for setting the reversing gearing to subtractive position upon movement of a division control member to operative position. For a complete disclosure of suitable division control means reference is hereby made to the British patent to Friden No. 342,044, accepted January 29, 1931. The only part of such mechanism shown herein is a pin 602B (Figure 2) which is secured to a member adapted to be moved rearwardly by a division operation initiating member upon movement thereof to operative position. Said pin 602B is disposed immediately in front of an upward extension 227B on link 227 so that rearward movement of said pin causes similar movement of link 227 to determine operation of the mechanism adapted to set the reversing gearing to subtractive position in the manner described above. It is to be noted that such rearward movement of link 227 through bellcrank 225 and roller 223 causes oscillation of control plate 120 to determine engagement of the auxiliary clutch whereby the reversing gearing is set and the main clutch engaged.

Means are provided for latching the reversing mechanism in subtractive position upon movement of the same thereto, until the end of the subtracting operation and the disengagement of the clutch. The slide 227 engages a lateral extension 233A on a spring pressed plunger 233 (Figure 2), normally holding the same in depressed position. Upon rearward movement of link 227, a notch 227E permits the plunger 233 to move upwardly under the influence of compression spring 234, the nose of said plunger impinging against a cam 229C formed on member 229A. When member 229 is rocked in counter-clockwise direction by cam 232, the cam surface 229C moves from over the plunger 233, allowing the same to move upwardly under the influence of spring 234 to a position in front of the forward edge of said cam, thereby holding member 229, shaft 144 and pin 134 in the position to cause subtractive rotation. When the operation control device is released, that is, either the minus key or the division lever, the slide or link 227 moves forwardly under the influence of spring 226, and again depresses the plunger 233 permitting member 229 to be restored to its normal position, as shown in Figure 2, by the spring 231.

Differential mechanism

The machine is provided with a plurality of banks of numeral keys, one of which is shown in Figure 1, the said numeral keys 315 being suitably mounted in the top plate and being normally held in raised position by springs, as disclosed in the above mentioned patent which also discloses suitable means for latching a key in depressed position. Each key stem is provided with a cam surface 315A adapted to cooperate with a pin 314A secured to a slide 314 which is mounted for longitudinal movement on its supporting bracket by pin and slot connections 314B being normally held in rearward position by spring 313. The key stems are equally spaced apart, the spacing thereof being slightly greater

than the spacing of pins 314A on slide 314 so that the cam surfaces 315A on the various keys are adapted to move the slide 314 differential amounts corresponding to the particular key depressed. A rack 314C formed on the under side of each slide 314 cooperates with the gear teeth 312A on a pivoted stepped plate 312 so that the plate 312 is rocked according to the value of the key depressed to position the corresponding step thereon in alignment with a lug 308A on a selection lever 308 pivoted at 309.

Pivoted to the selection lever 308 at 308B is member 310 which is normally held in the position shown in Figure 1 in which a lateral extension 310B thereon is held against the selection lever 308 by a spring 310A surrounding an upwardly extending arm of said member 310 and compressed between said member and an ear 308C of the selection lever 308. The arrangement is such that when clockwise rotation is imparted to the member 310 by means to be hereinafter described, such member, through compression spring 310A moves the selection lever 308 upwardly until the lug 308A engages the step of plate 312 which is positioned opposite thereto. During the upward movement of said selection lever 308, rack 307 formed on the rearward end thereof rotates the settable selecting element 305 in a counter-clockwise direction to set a value therein corresponding to the value of the depressed key. Reference is hereby made to the above mentioned patent to Friden for a more detailed description of such selecting mechanism and the manner in which it controls the transferring of values from the actuator 300 to the register mounted in the shiftable register carriage 400.

Means are provided whereby operation of the auxiliary clutch transfers the values set in the keyboard to the selection mechanism. Secured to arm 184 and extending rearwardly therefrom is a link 191 (Figures 4, 5, and 1) the rearward end of which is pivotally connected to the upper arm of a lever 192 by shaft 191A which lies immediately forward of member 310 pivoted to selection lever 308. As previously described, upward movement of member 310 about its pivot point compresses spring 310A which then expands to rock selection lever 308 upwardly until lug 308A thereon engages the aligned step of step plate 312 thereby rotating the selection element 305 to set a value therein corresponding to the value of the depressed key in that order. So it is seen that when arm 184 is moved rearwardly by the auxiliary clutch, link 191 and shaft 191A serve to rock member 310, compress spring 310A, and rock selection lever 308 upwardly to set the selection in the actuating mechanism.

Means are provided for locking the selection mechanism during operation of the machine comprising a locking dog loosely keyed on shaft 841 (Figure 1) and adapted to engage the rack formed on the settable selecting element 305 to prevent movement thereof. The locking mechanism is moved to active position by a linkage operated by the auxiliary clutch, said linkage being provided with a lost motion connection so that the values are set into the actuator before the selection lock becomes effective. For this purpose locking dogs 840 are provided with keys extending into a wider spline of shaft 841, the arrangement being such that the shaft may be rocked some distance in a counter-clockwise direction before the keys of the dogs are picked up. Arm 194 (Figure 1) fast on shaft 841 is connected by a link 193 with the lower arm of lever 192 which is rocked by the auxiliary clutch in the manner described above.

The arrangement is such that rearward movement of link 191 causes, through lever 192, forward movement of link 193 and a delayed counter-clockwise oscillation of locking dogs 840 into engagement with the rack formed on selecting element 305 thereby locking the selecting element in position, such locking engagement being maintained until the release of arm 184 at the conclusion of the operation. The lost motion between locking dogs 840 and shaft 841 is provided to allow time for the setting of the selection in the actuator by movement of selection lever 308 before the locking dogs 840 are rocked into engagement with the rack of selecting element 305.

Registering mechanism

Reference is made to the above mentioned patent to Friden, Number 1,643,710 for a complete disclosure of suitable registering mechanism. For the purposes of the instant invention it is sufficient to understand that the registering mechanism carriage 400 is slidably mounted in suitable guides in the frame of the machine and is capable of displacement to a plurality of ordinal positions to receive actuation by the actuating mechanism 300. Means are provided for locking the registering carriage 400 in position during the actuation. Such means comprises a rack 401 (Figure 1) secured to the rear of said carriage, said rack being notched to receive a locking member 598 which is pivoted on the actuator shaft and is normally held out of engagement with said rack by spring 598A.

Means are provided for engaging a locking member for the shiftable carriage upon operation of the auxiliary clutch. As shown in Figure 1, an arm 196 is secured to the shaft 841 near the right end thereof as viewed from the front of the machine. Said arm 196 is provided with a pin 196A which lies immediately forward of the downwardly extending tail 598B of locking lever 598 so that the auxiliary clutch acting through link 183, arm 184, link 191, link 193, arm 194, shaft 841, and arm 196, rocks said locking lever 598 in a clockwise direction so that the upper end thereof moves into engagement with the rack 401 on the carriage, thereby preventing lateral displacement thereof during operation of the machine.

I claim:

1. In a motor driven calculating machine, actuating mechanism, a clutch between said motor and said actuating mechanism, an auxiliary clutch, means controlled by said auxiliary clutch for determining engagement of said first named clutch, spring means for effecting disengagement of said first named clutch means for restraining said last named means to prevent operation thereof, and means for tripping said restraining means and returning said engagement determining means to inactive position.

2. In a motor driven calculating machine, actuating mechanism, a clutch between said motor and said actuating mechanism, an auxiliary clutch, manually operable controlling means therefor, means controlled by said auxiliary clutch for determining engagement of said first named clutch, spring means for preventing disengagement of said first named clutch means for restraining said last named means to prevent operation thereof, and means controlled by said manually operable means for disabling said restraining means.

3. In a motor driven calculating machine, actuating mechanism, transmission mechanism in-

cluding a clutch and reversing means, power operated means including an auxiliary clutch for positioning said reversing means and engaging said first named clutch, and manually operable means for determining operation of said auxiliary clutch.

4. In a motor driven calculating machine, actuating mechanism, transmission mechanism including a clutch and reversing means, an auxiliary clutch, normally disabled means controlled by said auxiliary clutch for positioning said reversing means, means controlled by said auxiliary clutch for engaging said first named clutch, control means for initiating negative actuation, and means controlled thereby for enabling said positioning means and engaging said auxiliary clutch.

5. In a motor driven calculating machine, actuating mechanism and selecting mechanism therefor, driving means for said actuating mechanism including a clutch, means for introducing values into the machine, means for initiating operation of the machine including an auxiliary clutch, and means controlled thereby for transferring the values to the selecting mechanism and engaging the first named clutch seriatim.

6. In a motor driven calculating machine, actuating mechanism and selecting mechanism therefor, driving means for said actuating mechanism including a clutch, means for introducing values into the machine, means for initiating operation of the machine including an auxiliary clutch, means for transferring the values to the selecting mechanism, means for locking the selecting mechanism in set position, and means controlled by the auxiliary clutch for operating the transferring means and the locking means and for engaging the first named clutch seriatim.

7. In a motor driven calculating machine, actuating mechanism and selecting mechanism therefor, a reversible transmission including a clutch and reversing means, means for introducing values into the machine, means for initiating operation of the machine including an auxiliary clutch, and means controlled thereby for transferring the values to the selecting mechanism, positioning said reversing means and thereafter engaging said first named clutch.

8. In a motor driven calculating machine, actuating mechanism and selecting mechanism therefor, a main clutch for connecting said actuating mechanism to the motor means for introducing values into the machine, means for initiating operation of the main clutch including an auxiliary clutch, and means controlled thereby for transferring the values to the selecting mechanism.

9. In a motor driven calculating machine, actuating mechanism and selecting mechanism therefor, a main clutch for connecting said actuating mechanism to the motor means for introducing values into the machine, means for initiating operation of the main clutch including an auxiliary clutch, means for transferring the values to the selecting mechanism, means for locking the selecting mechanism in set position, and means controlled by the auxiliary clutch for operating the transferring means and the locking means seriatim.

10. In a motor driven calculating machine, actuating mechanism and selecting mechanism therefor, driving means for said actuating mechanism including a clutch, means for introducing values into the machine, means for transferring the values to the selecting mechanism, means for locking the selecting mechanism in set position, and auxiliary power driven means operable before engagement of said clutch for operating said transferring means and said locking means seriatim.

11. In a motor driven calculating machine having a displaceable carriage, actuating mechanism and driving means therefor including a clutch and clutch engaging means, means for locking said carriage against movement, auxiliary power driven means for initiating operation of the machine, and means operable thereby for operating said locking means and said clutch engaging means seriatim.

12. In a motor driven calculating machine having a displaceable carriage, actuating mechanism and driving means therefor including a clutch and clutch engaging means, means for locking said carriage against movement, means for initiating operation of the machine including an auxiliary clutch, and means controlled by said auxiliary clutch for operating said locking means.

13. In a motor driven calculating machine having a displaceable carriage, actuating mechanism and driving means therefor including a clutch and clutch engaging means, normally inactive means for locking said carriage against movement, means for initiating operation of the machine including an auxiliary clutch, means controlled by said auxiliary clutch for operating said locking means, and means for latching said locking means in active position.

14. In a motor driven calculating machine having a displaceable carriage, actuating mechanism and driving means therefor including a clutch and clutch engaging means, normally inactive means for locking said carriage against movement, means for initiating operation of the machine including an auxiliary clutch, means controlled by said auxiliary clutch for operating said locking means, means for latching said locking means in active position, and means for disabling said latching means at the end of the operation.

15. In a motor driven calculating machine, actuating mechanism and driving means therefor including a clutch, an auxiliary clutch, multiplier control mechanism including value introducing means and selecting mechanism, means responsive to operation of said value introducing means for engaging said auxiliary clutch, and means controlled by said auxiliary clutch for transferring the multiplier value to the selecting mechanism.

16. In a motor driven calculating machine, actuating mechanism and driving means therefor including a clutch, an auxiliary clutch, multiplying mechanism including multiplier keys and selecting mechanism, means responsive to manipulation of a multiplier key for engaging said auxiliary clutch, and means controlled by said auxiliary clutch for setting the value represented by the manipulated key into the selecting mechanism.

17. In a motor driven calculating machine, actuating mechanism and driving means therefor including a clutch and clutch control means, an auxiliary clutch, multiplier control mechanism comprising value introducing means and selecting mechanism, means controlled by said value introducing means for engaging said auxiliary clutch, and means controlled by said auxiliary clutch for transferring the value to the selecting mechanism and operating said clutch control means seriatim.

18. In a motor driven calculating machine, multiplier control mechanism comprising value introducing means and selecting mechanism, power

driven means, means controlled by said multiplier control for mechanism initiating operation of said power driven means, and means operable by said power driven means for transferring the multiplier value to the selecting mechanism.

19. In a motor driven calculating machine having multiplicand and multiplier selecting mechanisms, means for introducing a multiplicand value, means for introducing a multiplier value, a power driven member, means controlled by said multiplier value introducing means for initiating operation of the drive for said power driven element, and means controlled by said element for transferring the introduced multiplicand and multiplier values to the associated selecting mechanisms.

20. In a motor driven calculating machine, actuating mechanism, driving means therefor including a cyclic clutch, an auxiliary clutch for determining engagement of said cyclic clutch, a manually operable control member, means responsive to movement thereof to operative position for engaging said auxiliary clutch, and means responsive to movement thereof to inoperative position for disengaging said cyclic clutch at a predetermined cyclic position thereof.

21. In a motor driven calculating machine, actuating mechanism, a main clutch between said motor and said actuating mechanism, an auxiliary clutch, means controlled by said auxiliary clutch for determining engagement of said main clutch, spring means for effecting disengagement of said first named clutch means for latching said last-named means to prevent operation thereof and maintain said main clutch in operation, and means for tripping said latching means to permit disengagement of said main clutch.

22. In a motor driven calculating machine, actuating mechanism, a main clutch between said motor and said actuating mechanism, an auxiliary clutch, means controlled by said auxiliary clutch for determining engagement of said main clutch, spring means for effecting disengagement of said first named clutch means for latching said last-named means to prevent operation thereof, means operated by said motor for tripping said latching means to effect disengagement of said main clutch.

23. In a motor driven calculating machine, actuating mechanism, a main clutch between said motor and said actuating mechanism, an auxiliary clutch, means controlled by said auxiliary clutch for determining engagement of said main clutch, spring means for effecting disengagement of said first named clutch means for latching said last-named means to prevent operation thereof and to maintain said main clutch in operation, and means for disengaging said auxiliary clutch while said main clutch is thus maintained in operation.

24. In a motor driven calculating machine, actuating mechanism, a main clutch between said motor and said actuating mechanism, an auxiliary clutch, normally inactive means controlled by said auxiliary clutch for determining engagement of said main clutch, spring means for effecting disengagement of said main clutch means for latching said last-named means to prevent operation thereof and to maintain said main clutch in operation, means for disengaging said auxiliary clutch while said main clutch is thus maintained in operation, and separate means for tripping said latching means to effect disengagement of said main clutch.

25. In a motor driven calculating machine, actuating mechanism, a main clutch between said motor and said actuating mechanism, an auxiliary clutch, normally inactive means controlled by said auxiliary clutch for determining engagement of said main clutch, spring means for effecting disengagement of said main clutch means for latching said last-named means to prevent operation thereof and to maintain said main clutch in operation, means for disengaging said auxiliary clutch while said main clutch is thus maintained in operation, and separate means operated by said motor for tripping said latching means to effect disengagement of said main clutch.

26. In a motor driven calculating machine, actuating mechanism, a cyclic main clutch between said motor and said actuating mechanism, an auxiliary clutch, means normally effective to maintain said main clutch disengaged and controlled by said auxiliary clutch to effect engagement of said main clutch, means for latching said last named means in active position to maintain said main clutch in operation, and means selectively operable during the first or any subsequent cycle of operation of said main clutch for tripping said latching means whereby disengagement of said main clutch will be effected when said clutch next reaches a predetermined cyclic position.

27. In a motor driven calculating machine, actuating mechanism, a cyclic main clutch between said motor and said actuating mechanism, an auxiliary clutch, means normally effective to maintain said main clutch disengaged and controlled by said auxiliary clutch to effect engagement of said main clutch, means for latching said last named means in active position to maintain said main clutch in operation, means operated by said motor for tripping said latching means whereby disengagement of said main clutch will be effected when said clutch next reaches a predetermined cyclic position, and selective control devices for rendering said tripping means effective during the first or any subsequent cycle of operation of said main clutch.

GUSTAV LERCH.

CERTIFICATE OF CORRECTION.

Patent No. 2,148,760. February 28, 1939.

GUSTAV LERCH

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 7, first column, line 2, claim 18, for the words "for mechanism" read mechanism for; page 7, first column, line 58, and second column, lines 9 and 23, claims 23, 24 and 25 respectively, strike out the word "to"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 23rd day of May, A.D. 1939.

(Seal)

Henry Van Arsdale
Acting Commissioner of Patents.