March 15, 1932. C. M. F. FRIDEN 1,849,349

CALCULATING MACHINE

Original Filed June 27. 1925 2 Sheets-Sheet 1

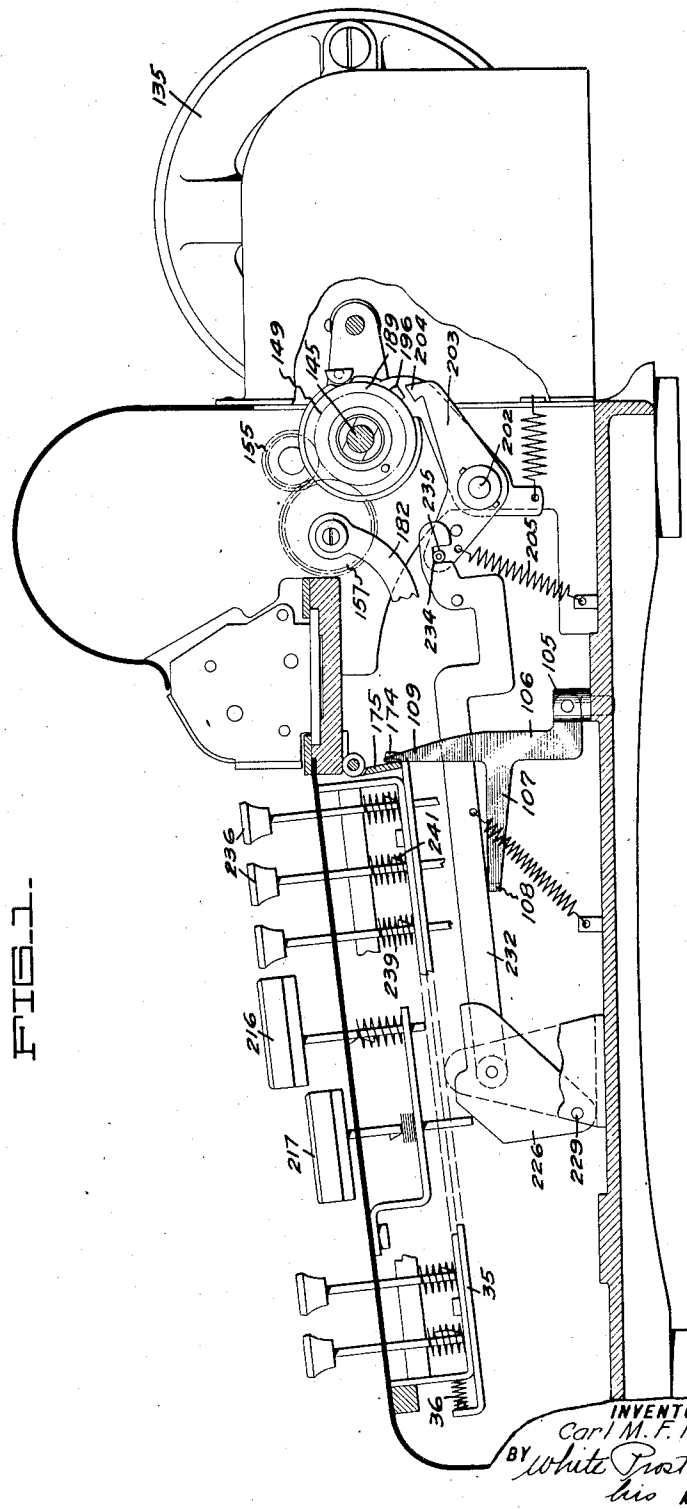

FIG. 1.

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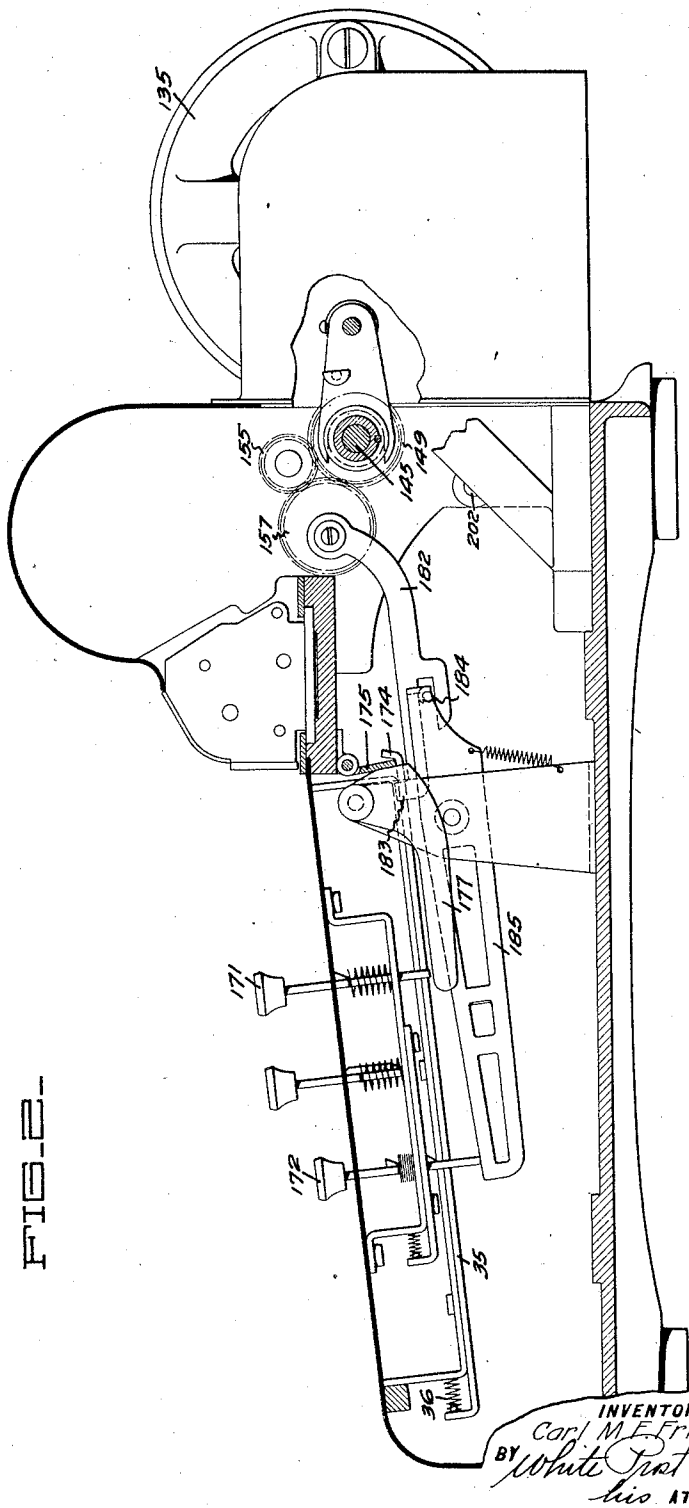

FIG-2-

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Patented Mar. 15, 1932 1,849,349

UNITED STATES PATENT OFFICE

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CALCULATING MACHINE

Application filed June 27, 1925, Serial No. 39,889. Renewed June 5, 1929.

The invention relates to power driven calculating machines and particularly to the improvement of the calculating machine disclosed in my United States Letters Patent Number 1,643,710, issued September 27, 1927.

Calculating machines of this type are constructed to perform problems in addition, subtraction, multiplication and division. The values are introduced into the machine by the depression of keys and the machine is thrown into operation by the depression of a starting control key, which connects the motor or other source of power with the calculating mechanism. In performing problems in division and multiplication, the motor rotates the calculating mechanism a plurality of times but in performing problems in addition and subtraction, the motor should rotate the calculating mechanism one time only.

An object of the invention is to provide means whereby, when the machine is set for performing problems in addition and subtraction, the motor is disconnected from the calculating mechanism during the first revolution of the the mechanism, so that the mechanism makes one revolution only for each depression of the starting control key.

Another object of the invention is to provide mechanism, which, when the machine is set to perform problems in addition or subtraction, will operate to release the depressed keys during the first revolution of the calculating mechanism. When set for performing problems in addition and subtraction, therefore, the keyboard is cleared and the machine is stopped after one revolution of the calculating mechanism. Means are provided for throwing the key releasing means and the mechanism stopping means out of adjustment, so that they do not function during the first revolution of the calculating mechanism, thereby permitting the mechanism to rotate a number of times when performing problems in multiplication and division.

A further object of the invention is to simplify the construction of the calculating machine disclosed in the above mentioned application.

The invention possesses 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 form of the device embodying 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.

The calculating machine disclosed in the accompanying drawings is in general the same as that disclosed in my above mentioned application, to which reference is hereby made for a disclosure of the complete machine. The drawings in this application are limited to the disclosure of the improvements.

Referring to said drawings:

Figure 1 is a longitudinal vertical section through a calculating machine showing the improvement of this invention in its environment.

Figure 2 is a longitudinal vertical section through another portion of the machine, showing the means for throwing the clearing and stopping device into and out of operation.

The machine disclosed in my above mentioned patent is a rotary type calculating machine, the calculating mechanism of which is driven by a motor 135. The motor is connected through suitable speed reducing gearing with the driving shaft 145, which extends into the clutch housing 189. The shaft is connected to and disconnected from the housing by means of a pawl, the end 196 of

which extends from the housing when the pawl is in engagement with the shaft 145. The pawl is carried by the housing and when the pawl is in engagement with the shaft the housing rotates with the shaft. The pawl is moved from engaging to disengaging position by the tooth 204 on the end of the clutch controlling lever 203, which is pivoted on the shaft 202. When the tooth 204 engages the end 196 of the pawl, it pushes said end inward and disengages the pawl from the shaft 145 and, at the same time, locks the clutch housing 189 in fixed position. The tooth 204 is normally urged toward the end 196 of the pawl by a spring 205 connected to the other end of the lever 203. When it is desired to cause the clutch to engage, the lever 203 is moved to move the tooth 204 away from the end 196 of the pawl, permitting the pawl to engage the shaft 145 and thereby cause engagement of the clutch.

The engagement and disengagement of the clutch is controlled by the starting control keys 216 and 217 which are associated with a rocking arm 226 fulcrumed on the pivot 229. Depression of either of the keys 216 or 217 causes movement of the rocking arm 226 in a clockwise direction. The key 217 is the subtraction key and when depressed causes rotation of the calculating mechanism in one direction and the key 216 is the addition key which when depressed causes rotation of the calculating mechanism in the opposite direction. This rotation of the calculating mechanism in opposite directions by the depression of either of the keys 216 or 217 is accomplished by reversing means which do not form a part of the present invention and which are not disclosed herein. The rocking arm 226 is connected to the clutch controlling lever 203 so that clockwise movement of the rocking arm causes clockwise movement of the lever 203, moving the tooth 204 out of contact with the projecting end 196 of the pawl. This connection preferably comprises a link 232 having a recess or seat 234 on its end which embraces a roller 235 mounted on the lever 203. Means are provided for raising the end of the link in which the recess is formed, to disconnect the link from the lever, so that the lever 203 may be returned to clutch disengaging position by the spring 205 and this means is operative during the rotation of the calculating mechanism so that the lever 203 may function to disengage the clutch and stop the clutch housing in neutral position. This means may operate during the first cycle or revolution of the calculating mechanism, or may be operated by hand at the end of any desired number of revolutions.

The values are entered into the calculating mechanism by the depression of keys 236, there being a plurality of banks of such keys and the keys in each bank having different values from 0 to 9, inclusive. The depression of a key serves to introduce the value represented by the key into the calculating mechanism. Means are provided for holding the depressed key in depressed position and, for this purpose each key shank is provided with a wedge shaped latch 241, which engages under the slide 35 when the key is depressed. The slide is normally held in forward position by the spring 36 and the depressed key is released by moving the slide backward to free the pawl 241. The depressed key is then raised by the spring 239. Since there are a plurality of banks of keys and consequently a plurality of slides 35, means are provided for simultaneously moving all of the slides 35 backward to release all of the depressed keys. For this purpose each slide is provided on its rear end with a tooth 174 which is disposed behind a pivoted gate 175, which extends across the keyboard and is disposed in cooperative relation with all of the teeth 174. Counter-clockwise movement of the gate 175 moves all of the slides 35 backward to release the depressed keys. Means are provided for moving the gate 175, optionally, by the operation of the machine or by hand. When performing operations in multiplication and division, it is desirable that the keys remain depressed and in this circumstance the keys are preferably released by manually operated means, at the end of the calculating operation. These manually operated means comprise a key 171 which cooperates with a lever 177 having a flat end bearing against the gate 175, so that when the key 171 is depressed the gate 175 is rocked to release the depressed keys 236.

The automatically operated means comprises an arm 182 having a hook 183 on its end, which, when the arm is properly positioned and reciprocating, engages the gate 175, and rocks the gate to release the depressed keys 236. The arm 182 is pivoted eccentrically on the gear 157 which is connected through the gear 155 to the gear 149 which is secured to the clutch housing 189. The clutch housing is operatively connected with the calculating mechanism, so that the calculating mechanism and the clutch housing rotate together. The gear 157 makes one revolution for each rotation of the calculating mechanism and consequently the tooth 183 on the end of the lever 182 is reciprocated once for each revolution of the calculating mechanism. The arm 182 is supported on a bearing 184 carried by the lever 185 and, by rocking the lever 185, the vertical position of the bearing 184 is varied and consequently the path of travel of the tooth 183 is displaced. When the bearing 184 is in its lower position, the path of movement of the tooth 183 is remote from the gate 175 but when the bearing 184 is in its raised position, the tooth 183 engages the gate 175 and rocks the gate to release the depressed keys 236. The position

of the lever 185 is controlled by the key 172. When this key is in its depressed position the bearing 184 is in its elevated position and when the key 172 is in its raised position, the bearing 184 is in its depressed position. With the key 172 depressed, the arm 182 will rock the gate once for each rotation of the calculating mechanism and such movement of the gate will occur during the cycle of rotation and in advance of the end of the cycle of rotation. When the machine is set to perform problems in addition or subtraction, the key 172 is depressed and when the machine is set to perform problems in multiplication and division, the key 172 is in its elevated position as shown in my said Patent Number 1,643,710.

Means are provided for connecting the gate 175 with the link 232, so that as the gate 175 is rocked, the link 232 is moved out of engagement with the lever 203. Pivoted on a stud 105 mounted on the base of the machine, is a lever 106 having an arm 109 extending upward into position directly behind the gate 175 and having another arm 107 extending laterally and provided at its end with a tooth or bearing 108 which is disposed below and adjacent to the link 232. When the gate 175 is rocked to release the keys 236, the lever 106 is also rocked, causing the bearing 108 to raise the link 232 to lift the recess 234 away from engagement with the roller 235 on the lever 203, thus permitting the spring 205 to move the lever 203 to cause the clutch to be disengaged and the clutch housing to be halted. It is seen that by the use of this invention a very simple device is employed for transferring the motion from the gate 175 to the lever 232 and that, in performing problems in addition and subtraction, the keyboard is cleared during the first revolution of the calculating mechanism and the calculating mechanism is brought to a stop at the end of its first revolution.

I claim:

1. In a calculating machine, a motor for operating the calculating mechanism, a normally disengaged clutch between the motor and the calculating mechanism, depressible keys for introducing values into the calculating mechanism, means for holding the depressed keys in depressed position, a gate movable to release the depressed keys, a starting control key, means operative by the depression of the starting control key for engaging the clutch to cause rotation of the calculating mechanism, means operative during the first revolution of the calculating mechanism for moving the gate and a lever connecting the gate and the clutch controlling means for causing movement of the gate to move the clutch controlling means to disengage the clutch.

2. In a calculating machine, a motor for operating the calculating mechanism, a normally disengaged clutch between the motor and the calculating mechanism, a lever for controlling the operation of the clutch, a link connected to said lever, a starting control key cooperating with said link whereby depression of the key moves the control lever to cause engagement of the clutch, depressible keys for introducing values into the calculating mechanism, means for holding the depressed keys in depressed position, a gate movable to release the depressed keys, means operative during the first revolution of the calculating mechanism for moving the gate to release the depressed keys and a lever connecting the gate with the link for causing key releasing movement of the gate to move the link from engagement with the clutch controlling lever.

3. In a calculating machine, actuating means, setting means therefor, means for clearing said setting means, a member for controlling the operation of said actuating means, and means controlled by said clearing means for superseding the control of said actuating means normally exercised by said member.

4. In a calculating machine, actuating means, setting means therefor, means for clearing said setting means, a member for controlling the operation of said actuating means, and means controlled by said clearing means for arresting said actuating means irrespective of the position of said member.

5. In a calculating machine, actuating means, setting means therefor comprising a plurality of banks of keys, a common clearing means for said key banks, a member for controlling the operation of said actuating means, and means controlled by said clearing means for superseding the control of said actuating means normally exercised by said member.

6. In a calculating machine, actuating means, setting means therefor comprising a plurality of banks of keys, a common clearing means for said key banks, a member for controlling the operation of said actuating means, and means controlled by said clearing means for arresting said actuating means irrespective of the position of said member.

7. In a calculating machine, independently operable members for controlling the setting and operation of the machine, respectively, restoring means for one of said members, and means controlled by said restoring means for superseding the control exercised by the other of said members.

8. In a calculating machine, a plurality of banks of settable keys, differential actuating mechanism adjustable thereby, a member for controlling operation of said mechanism, means for releasing said keys, and means controlled by said releasing means for removing said member from control of said mechanism.

9. In a calculating machine, actuating

mechanism, setting means therefor, automatically operable means for clearing said setting means, means controlled by said clearing means for arresting said actuating mechanism, and means for disabling said automatic clearing means.

10. In a calculating machine, actuating mechanism, setting means therefor comprising a plurality of banks of keys, an automatically operable common clearing means for said key banks, means operable by said clearing means for arresting said actuating mechanism, and means for disabling said clearing means.

In testimony whereof, I have hereunto set my hand.

CARL M. F. FRIDEN.