Aug. 25, 1942. C. M. F. FRIDEN 2,294,111

CALCULATING MACHINE

Filed Feb. 12, 1940 3 Sheets-Sheet 1

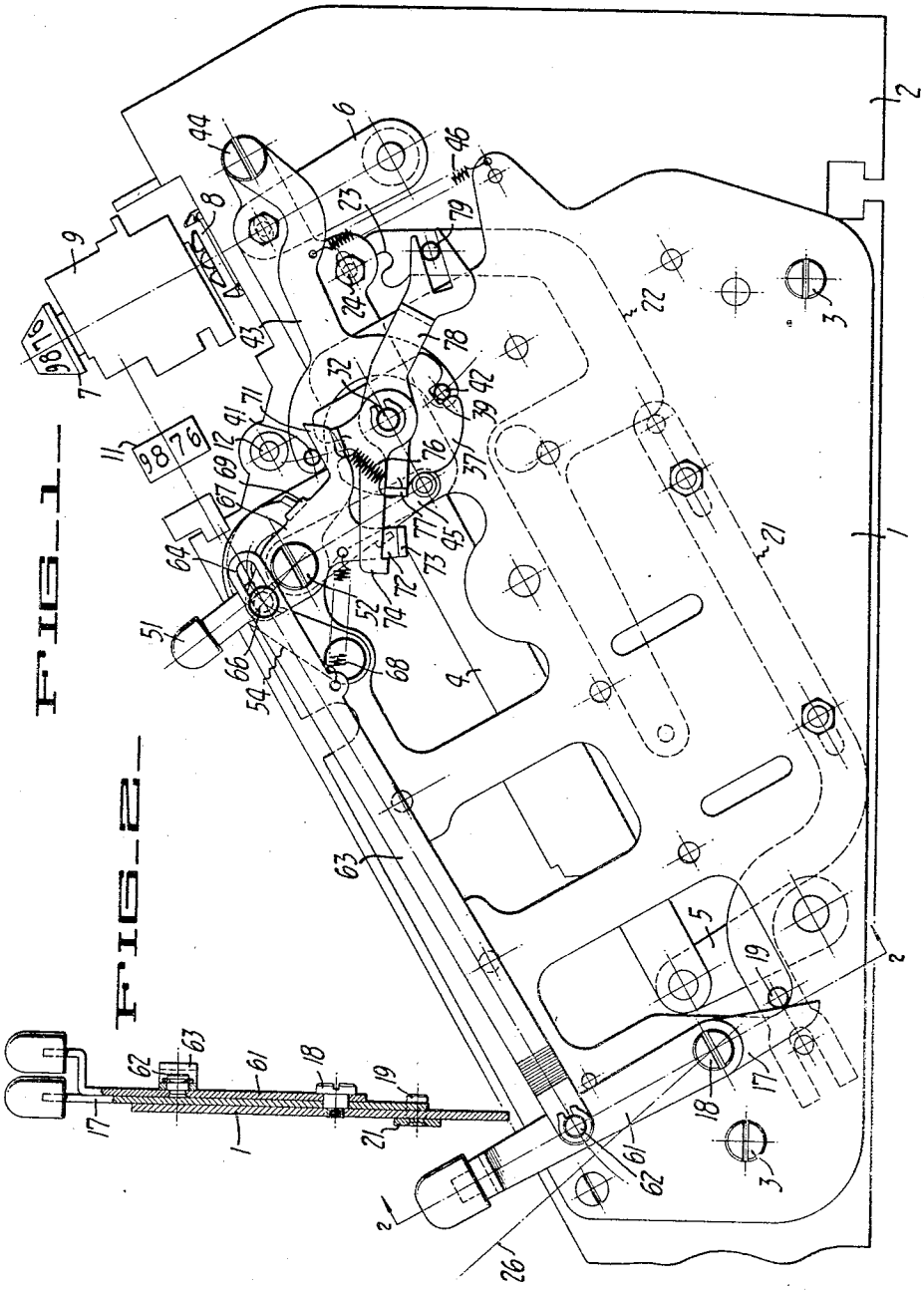


FIG. 1

FIG. 2

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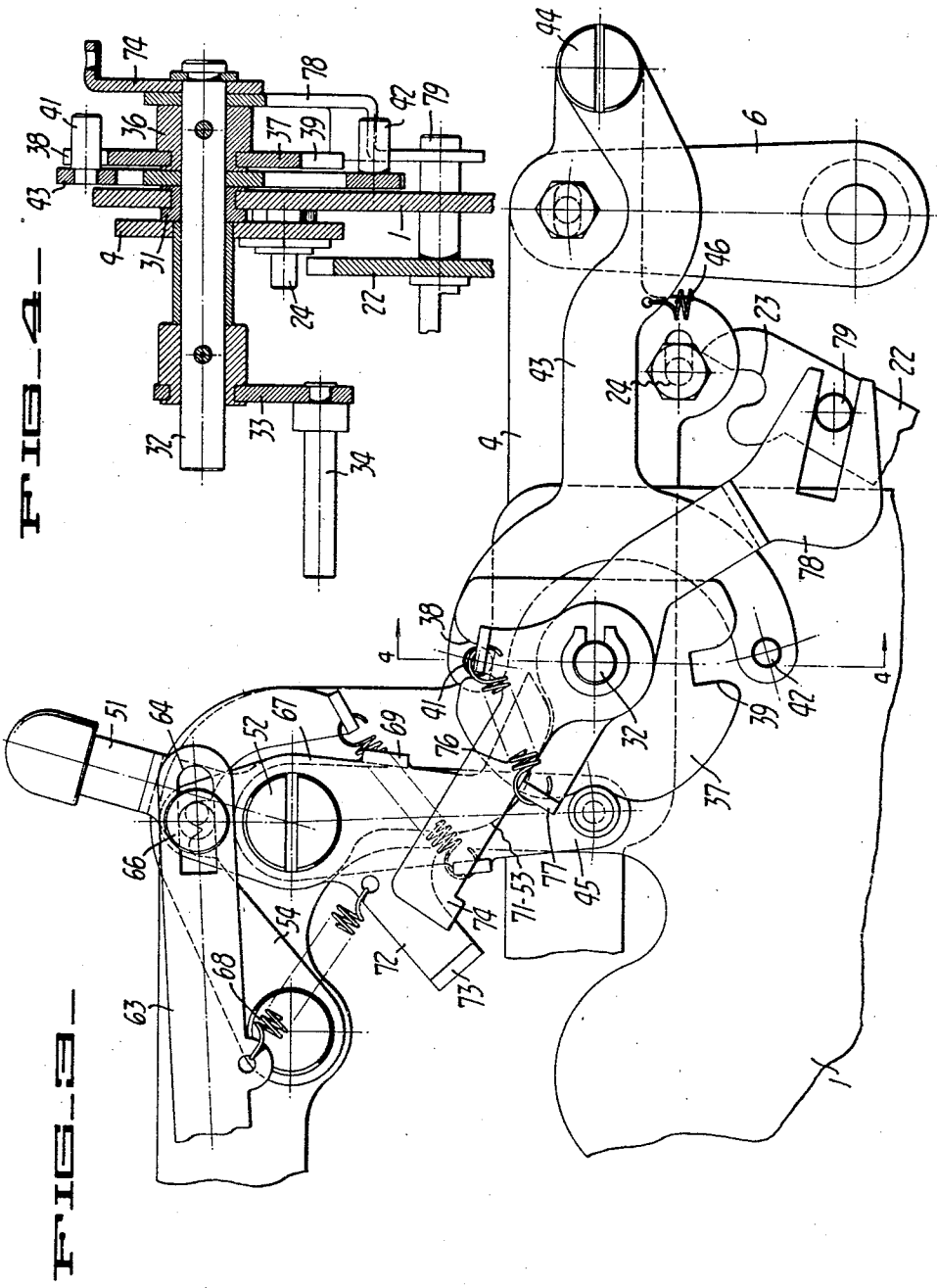


FIG. 4

FIG. 3

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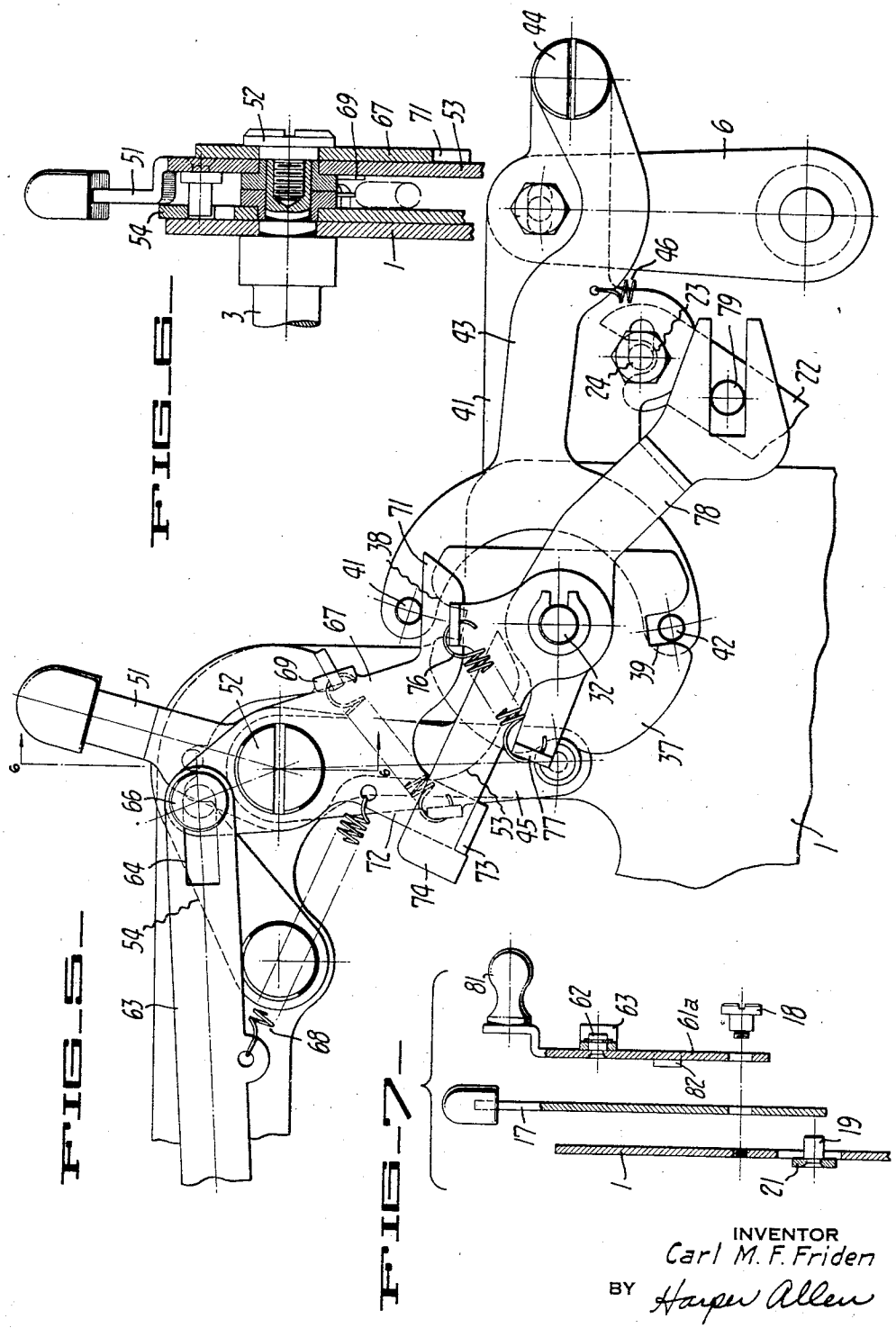


FIG. 6

FIG. 5

FIG. 7

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Patented Aug. 25, 1942

2,294,111

UNITED STATES PATENT OFFICE

2,294,111

CALCULATING MACHINE

Carl M. F. Friden, San Leandro, Calif., assignor to Friden Calculating Machine Co., Inc., a corporation of California

Application February 12, 1940, Serial No. 318,433

7 Claims. (Cl. 235—75)

This invention relates to calculating machines and is concerned more particularly with a provision of improved control means for controlling registrations on the revolutions counter.

This application is a continuation in part of my copending application, Serial No. 295,284, filed September 16, 1939, for a calculating machine.

It is the general object of the invention to provide improved means for controlling the sign character of the registration on the revolutions counter of a calculating machine.

Another object of the invention is to provide improved means for controlling the sign character of registrations on the revolutions counter during division operations.

Another object of the invention is to provide improved control means whereby the operator can obtain both true figure and complementary quotients as desired.

Other objects and advantages will appear from the following description of the preferred form of the invention taken in connection with the accompanying drawings, in which:

Fig. 1 is a fragmentary side elevational view of a calculating machine embodying the instant invention.

Fig. 2 is a detailed section taken in a plane indicated by the line 2—2 in Fig. 1.

Fig. 3 is an enlarged view of a part of the mechanism shown in Fig. 1 in a different adjusted position thereof.

Fig. 4 is a detailed sectional view taken in a plane indicated by the line 4—4 in Fig. 3.

Fig. 5 is a view similar to Fig. 3 but showing the parts in a different adjusted position.

Fig. 6 is a detailed sectional view taken in a plane indicated by the line 6—6 in Fig. 5.

Fig. 7 is an exploded view of the control levers of a modified form of the invention.

The calculating machine selected for illustration in connection with the instant invention is of the type fully disclosed in my Patent 2,229,889, together with the improvements thereon illustrated in my copending application, Serial No. 35,619, filed August 10, 1935.

In performing division operations in calculating machines it is generally desirable to obtain true figure quotients and for this purpose there is usually provided an automatic control whereby the registrations on the revolutions counter are set to be positive at the same time that the registrations on the accumulator are set to be negative so that the desired quotient figure will be obtained. In some instances, however, it is desirable to obtain complementary quotient figures so that it is preferable that the sign character of the registration be controlled by the operator. At the same time this control should be selective and enable a convenient setting of the control means to obtain true figure quotients because the major number of operations are of this character. The present invention is designed to obtain this result in a simple and expeditious manner, so that the desired type of quotient figure can be obtained with a minimum of adjustments of the machine as a preliminary to the operation.

Referring to Fig. 1 the machine includes a frame plate 1 which may be mounted in spaced relation from the usual side plate 2 of the calculator by means of studs 3. Plate 1 carries certain conventional parts of the calculator including plus-minus slide 4 which is mounted for movement in either direction by means of arms 5 and 6 to control the sign character of the registration on the accumulator 7 by its actuating means including plus-minus gears 8. As shown, accumulator 7 is supported in shiftable carriage 9 which is suitably mounted on the frame in the usual manner and also carries revolutions counter 11 having suitable actuating means 12 of conventional construction.

The plus-minus slide 4 may be set in any convenient manner, for example by the usual plus-minus keys (not shown) or by means of the division lever 17 pivoted by stud 18 on plate 1, and having its lower end disposed to engage pin 19 on slide 21 which is suitably mounted for endwise sliding movement on the plate 1 and has its end operatively engaged with a suitably mounted division control lever 22 of the character fully disclosed in said copending applications. At its rearward end, the lever 22 has a seat 23 for engagement with a pin 24 carried by the plus-minus slide 4, so that upon movement of the division lever to the position indicated by the dotted line 26 the lever 22 is rocked in a counter-clockwise direction, so that its seat engages the pin 24. In this rocking movement the plus-minus slide 4 is moved to the left as shown in Fig. 1 to accomplish a setting of the machine for subtractive operation on the accumulator.

Suitable means are also provided for selectively setting the actuating means for the revolutions counter to cause either positive or negative registration thereof, and for this purpose the plate 1 (Fig. 4) is apertured to receive a journal collar 31 in which rod 32 is mounted. To the left of plate 1, as viewed in Fig. 4, rod 32 carries a depending arm 33 having a pin 34 which when

raised or lowered controls the setting of the revolutions counter actuator for positive or negative registration on the counter in a manner fully disclosed in said copending application, Serial No. 724,482.

To the right of plate 1, as viewed in Fig. 4, rod 32 carries a hub 36 of a counter setting member 37 having respective upper and lower notches or seats 38 and 39 for engagement by the respective pins 41 and 42 carried at the forked end of an arm 43 which is pivoted at 44 to the end of plus-minus slide 4. Spring-urged centralizer 45 is provided for member 37. Arm 43 is normally spring-urged downwardly by spring 46 to engage pin 41 with seat 38. It will be seen that the engagement of pins 41 and 42 in their corresponding seats 38 and 39 determine the direction of rocking movement member 37 from its centralized position in response to a given movement of the plus-minus slide 4 so that the direction of registration on the revolutions counter can be reversed with respect to a given direction of registration on the accumulator.

A manually settable control is provided for selecting whether the registration in the revolutions counter will be like or unlike that in the accumulator and this control comprises the control lever 51, Figs. 1, 3, 5, and 6, pivotally mounted by stud 52 on plate 12, and having a foot 53 disposed below and adapted for engagement with pin 41 on arm 43. With the lever 51 positioned as shown in Fig. 1 the foot 53 is engaged with pin 41 and to lift arm 43 against the urgency of its spring 46 until pin 42 is engaged with its corresponding seat 39. In this position the registrations in the counter will be unlike those in the accumulator so that true figure quotients or complementary multipliers will result. With lever 51 positioned as shown in Fig. 3, the foot 53 is located below the pin 41 so that the arm 43 occupies its normal position under the urgency of its spring 46, when the pin 41 is engaged with its seat 38 and like registrations will occur in the accumulator and the revolutions counter.

Latch lever 54 may be provided for maintaining the selected adjusted position of counter control lever 51.

As previously stated optionally operable control means are provided whereby the operator can, if he desires, set the machine to provide for a positive quotient in the revolutions counter during division operations irrespective of the setting of the control lever 51, so that it is very convenient for the operator to obtain true figure results in the quotient.

For this purpose manually operable control lever 61 (Fig. 1) is pivoted on stud 18 alongside the division lever 17 and has its upper end offset (Fig. 2) to provide a handle in juxtaposed relation to the handle of the division lever 17 so that the two levers can be easily operated together by single manual stroke or so that the division lever can be operated alone if so desired. Adjacent its upper end the lever 61, Figs. 1 and 2, is pivoted by pin 62 to a link 63 which extends rearwardly and is provided with slot 64 engaged with a pin 66 at the upper end of an auxiliary control lever 67, also pivoted on stud 52. Link 63 and control lever 61 are urged rearwardly by spring 68 tensioned between link 63 and lever 67.

Control lever 67 (Fig. 2) is provided with an ear 69 which lies in front of lever 51, so that lever 67 must rock in a counter-clockwise direction with lever 51 and when actuated can move independently thereof in a counter-clockwise direction. It will be seen that forward movement of link 63 will rock lever 67 in a counter-clockwise direction so that its foot 71 which engages beneath pin 41 will move arm 43 upwardly to the position shown in Figs. 1 and 5 so that the counter registration will be unlike that of the accumulator registration.

Means are provided for latching the independent counter registration control means in active position when operated in starting a division operation. For this purpose a latch is provided for the auxiliary control lever 67 which is enabled when the division mechanism is placed in operative position. Control lever 67 (Fig. 1) is provided with a depending arm 72 terminating in an offset ear 73 for cooperation with a latch arm 74 pivoted on rod 32 and urged by spring 76 against the laterally extending ear 77 of a lever 78, also pivoted on rod 32. The lower end of lever 78 is offset and slotted to engage pin 79 on division control lever 22 so that the latch arm 74 is normally inactive as shown in Fig. 1. However, when a division operation is initiated and control lever 22 is moved from the position shown in Figs. 1 and 3 to that shown in Fig. 5, latch arm 54 is permitted to move down to engage ear 73 and maintain the adjusted position of the auxiliary control lever 67, as shown in Fig. 5, throughout the division operation.

It is believed that the operation of the machine will be apparent from the foregoing description but it will be reviewed briefly. With the parts positioned as shown in Fig. 1, control lever 51 causes registrations on the revolutions counter of a sign character unlike that of the accumulator, and the division lever 17 and the control lever 61 are in their normal inoperative positions. Fig. 3 illustrates the condition of the parts when the control lever 51 is moved from the position shown in Fig. 1 to that shown in Fig. 3 when the registrations on the revolutions counter will be like those of the accumulator. In both Figs. 1 and 3 the latch lever 74 is disabled because the division control lever 22 is in its inactive position.

If with the parts positioned as shown in Fig. 3 the operator moves the starting control levers 17 and 61 from the position shown in Fig. 1 to the position indicated by dotted line 26, control lever 67 is moved to the position shown in Fig. 5 whereby arm 43 is lifted thereby to place pin 42 in engagement with its associated seat 39 and determine registration on the revolutions counter unlike that in the accumulator so that a true figure quotient will result. Latch arm 74 is free to rock in a counter-clockwise direction under the influence of its spring 76 so that it engages ear 73 of control lever 67 and maintains the adjusted position thereof until the end of the division operation. At the end of the division operation, lever 22 is returned in the position shown in Fig. 1 by means of conventional character so that latch 72 is disabled.

With the parts positioned as shown in Fig. 3 to cause a complementary quotient, movement of division lever 17 alone will operate through control lever 22 to rock lever 78 to the position shown in Fig. 5, however as control lever 61 has not been operated, lever 67 remains in the position shown in Fig. 3 and the end of latch lever 74 moves into blocking relation with respect to ear 73 of lever 67 to maintain such lever and lever 51 in the positions shown in Fig. 3 throughout the division operation. This condition of the

parts also prevents operation of lever 61 during a division operation.

Figure 7 illustrates a modified form of the invention wherein selectively operable control means are provided whereby the operator can cause the use of the automatic sign character control to obtain a true figure quotient, or can selectively employ the setting of control lever 51 to obtain a complementary quotient. In Fig. 7, division control lever 17 is identical with that shown in Figs. 1–6 in both construction, mounting and mode of operation. However, auxiliary division control lever 61*a* is provided which is pivoted on stud 18 and connected to link 63 in the same manner as lever 61 of Figs. 1–6. Lever 61*a* however is provided with laterally extending handle portion 81 which is spaced from the handle portion of lever 17 to facilitate independent manipulation thereof. Lever 61*a* is also provided with laterally extending ear 82 which overlaps lever 17 to effect simultaneous rocking movement thereof with lever 61*a*.

In operation, when a true figure quotient is desired, lever 61*a* is operated to start the division operation, control lever 17 being rocked therewith. When a complementary quotient is desired, counter reverse control lever 51 is set to the proper position and control lever 17 is operated to start the division operation.

I claim:

1. In a calculating machine having an accumulator, a revolutions counter, and respective actuating means therefor to effect both positive and negative registrations thereon; settable control means for causing registrations on said counter like or unlike the registrations on said accumulator, manually operable control means for initiating operation of said accumulator actuating means and for selecting the sign character of the registration thereof, and other manually operable control means cooperatively related to said first named manually operable control means for optional simultaneous manipulation therewith by a single manual stroke to supersede the control of said settable control means, said settable control means being responsive to manipulation of both said manually operable control means to cause registration of a result of predetermined sign character on said counter.

2. In a calculating machine having an accumulator, a revolutions counter, and respective actuating means therefor to effect both positive and negative registrations thereon; settable control means including a manually settable member for causing registrations on said counter like or unlike the registrations on said accumulator, manually operable control means for initiating operation of said actuating means and for selecting the sign character of the registrations thereof, and means cooperatively related to said first named manually operable control means for superseding the control of said settable member to cause registration of a result of predetermined sign character on said counter.

3. In a calculating machine having an accumulator, a revolutions counter, respective actuating means therefor to effect both positive and negative registrations thereon, and counter mechanism including settable means for selecting the sign character of the registration on said revolutions counter, and other means operable to supersede the control of said settable means and cause registration of a result of selected sign character on said counter; division control mechanism including an operation initiating key having controlling connections to cause operation of said respective actuating means with the registration on said counter under control of said settable means, and a second operation initiating key for causing operation of said actuating means with said other means operative to supersede the control of said settable means.

4. In a calculating machine having an accumulator, a revolutions counter, respective actuating means therefor to effect both positive and negative registration thereon, and counter control mechanism including settable means for selecting the sign character of the registration on said revolutions counter, said counter control mechanism also including means operable to supersede the control of said settable means and cause registration of a result of selected sign character on said counter; division control mechanism including a pair of selectively operable division starting members, one of said members being operable to control registering operation with the counter registration under control of said settable means, and the other of said members having a controlling connection with said superseding means to cause registering operation of said machine with said superseding means in active position to control the counter registration.

5. In a calculating machine having an accumulator, a revolutions counter, and respective actuating means therefor to effect both positive and negative registrations thereon; settable control means for selectively causing registrations on said counter like or unlike the registrations on said accumulator, division control mechanism including a manually operable control key for initiating operation of the machine and for causing subtractive operations on said accumulator, and means including a key cooperatively related to said settable control means to supersede control thereof, said last-named key being mounted in juxtaposed relation to said division control key for operation therewith by a single manual stroke, and said settable control means being responsive to operation of both said keys to cause registration of a quotient figure of predetermined sign character on said counter.

6. In a calculating machine having an accumulator, a revolutions counter, and respective actuating means therefor to effect both positive and negative registrations thereon; settable control means for selectively causing registrations on said counter like or unlike the registrations on said accumulator, division control mechanism including a manually operable control key for initiating operation of the machine and for causing subtractive operations on said accumulator, an auxiliary control key mounted in juxtaposed relation to said division control key for operation therewith by a single manual stroke, and means operated by said auxiliary control key and related to said settable control means to supersede the control thereof, said settable control means being responsive to operation of both said keys to cause registration of a quotient figure of predetermined sign character on said counter.

7. In a calculating machine having an accumulator, a revolutions counter, and respective actuating means therefor to effect both positive and negative registrations thereon; settable control means for causing registrations on said counter to be like or unlike the registrations on said accumulator, said control means including a settable member having a position for causing

like registrations and another position for causing unlike registrations and an adjustable key for controlling setting of said member, division control mechanism including a division key for initiating subtractive operation on said accumulator, an auxiliary key mounted in side-by-side relation with said division key for simultaneous operation by the same manual stroke, and means operated by said auxiliary key for setting said member to cause unlike registrations irrespective of the adjustment of said first-named key, whereby conjoint operation of said division key and said auxiliary key will cause initiation of additive operation on said counter.

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