

June 21, 1938.

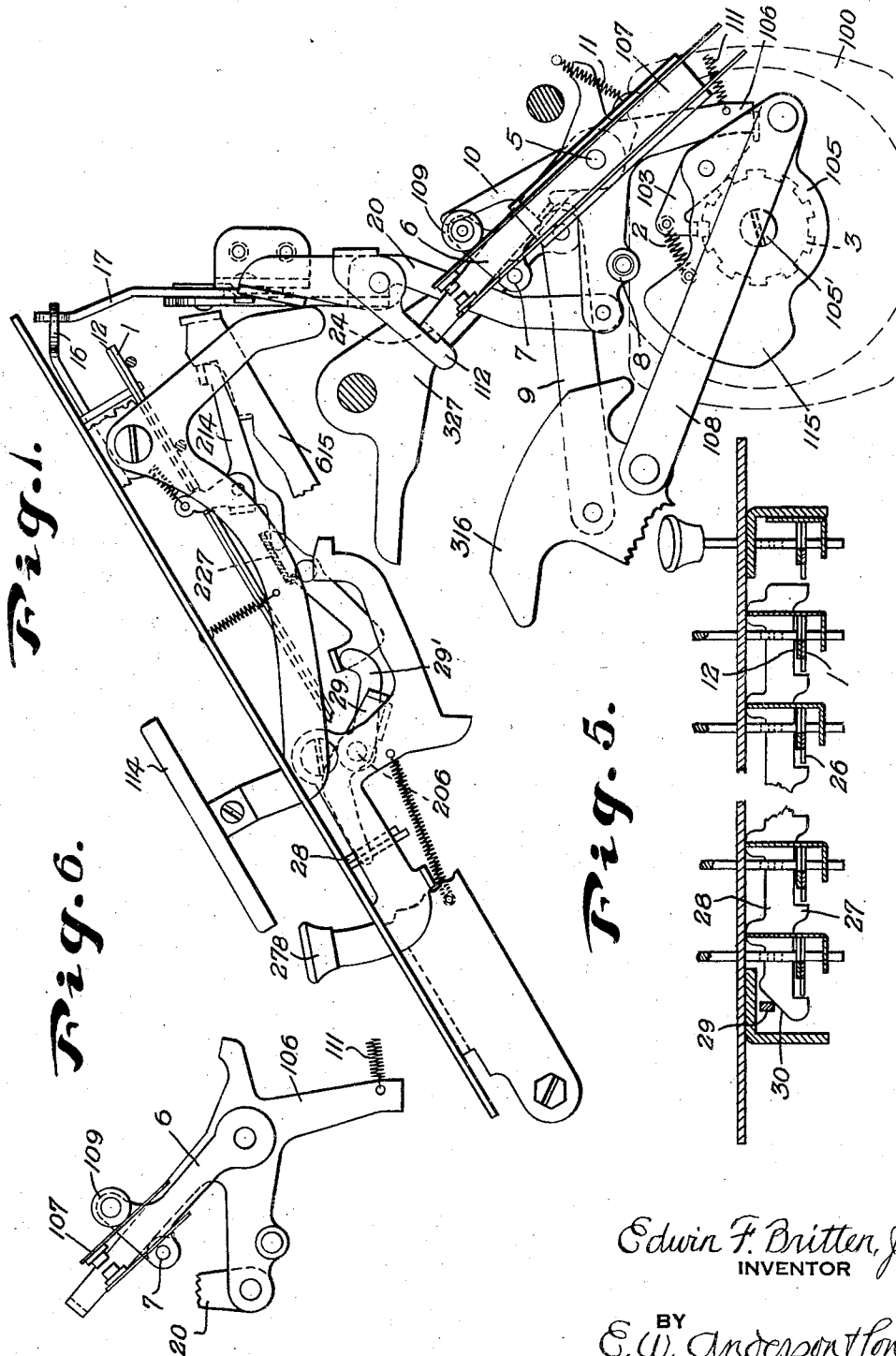
E. F. BRITTEN, JR

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CALCULATING MACHINE

Filed Dec. 29, 1936

2 Sheets-Sheet 1



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INVENTOR

BY
E. W. Anderson & Son
ATTORNEYS

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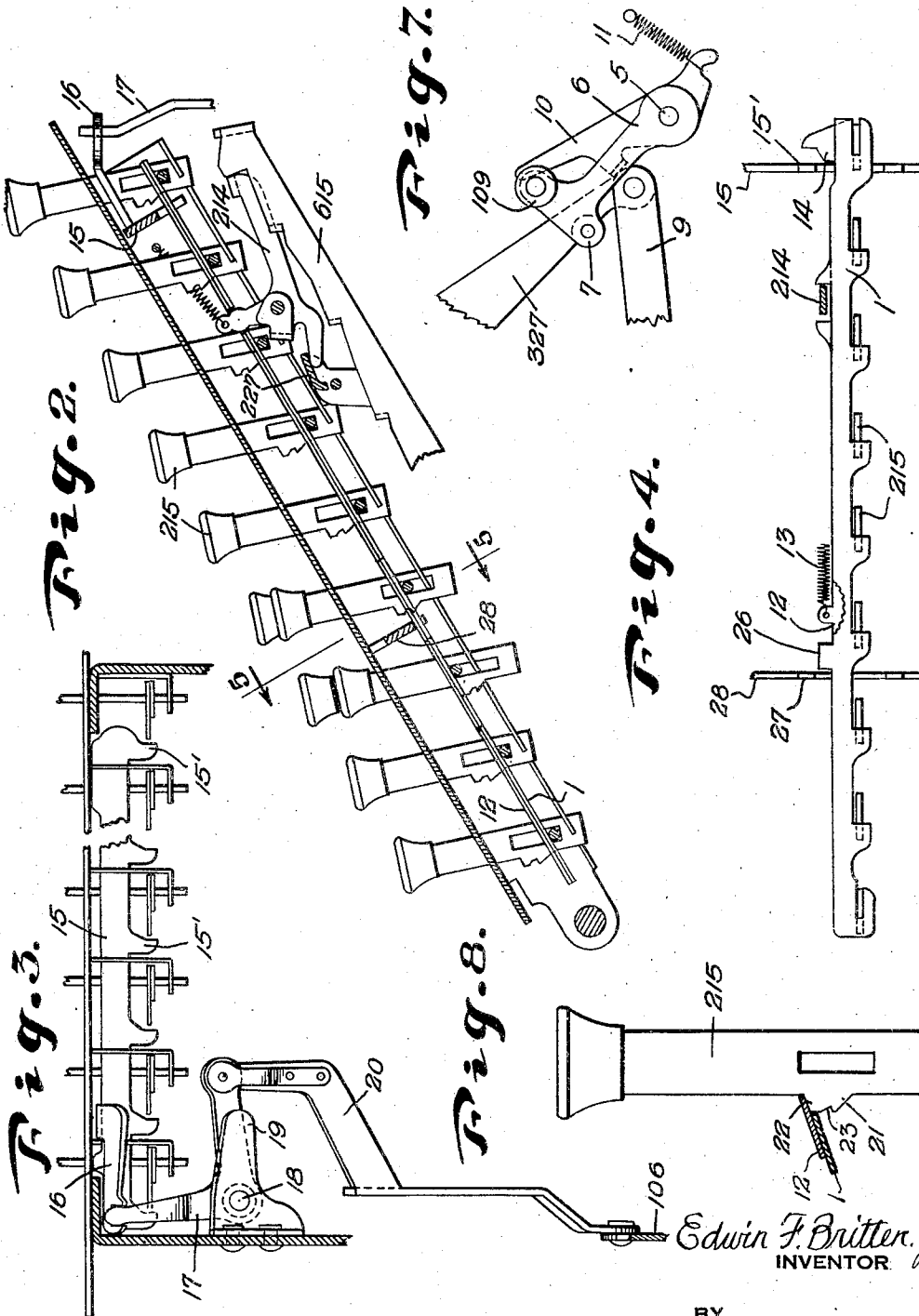
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ATTORNEYS

UNITED STATES PATENT OFFICE

2,121,683

CALCULATING MACHINE

Edwin F. Britten, Jr., Short Hills, N. J., assignor
to Gardner Company, Orange, N. J., a corpo-
ration of Delaware

Application December 29, 1936, Serial No. 118,133

4 Claims. (Cl. 235—60)

The invention has relation to calculating machines, and particularly to the keyboard mechanism thereof.

Full stroke mechanism for the digital keys of key drive adding machines is well known wherein a partially depressed digital key is held in half position.

It is also known to provide means for latching the digital keys of key-set calculating machines in fully depressed position. It frequently happens however, that an operator may fail to depress a key sufficiently for it to be latched, and since the machine may be operated while the key is so held, a miscalculation may result.

It has also been proposed, according to U. S. Patent No. 1,377,802, issued to the present inventor on September 20, 1932, to provide a special switch in the motor circuit, which switch remains broken so long as any digital key is in partially depressed position. Here, however, there is no latch for holding said key partially depressed, and therefore the partially depressed key will on release thereof return to normal position, thereby closing the switch and allowing an incorrect operation.

It is the object of the present invention to provide means for rendering the cycle operating mechanism inoperative until complete depression of any partially depressed digital key.

Another object is to provide means whereby a key held partially or fully depressed will act to lock a total taking key against depression.

The invention consists in the novel construction and combinations of parts as hereinafter set forth in the claims.

In the accompanying drawings,

Figure 1 is a right side elevation of certain parts of the machine, broken away in part, and showing the cycle operating switch and clutch means.

Figure 2 is a composite longitudinal section of the keyboard and parts operating in connection therewith, broken away in part.

Figure 3 is a rear elevation of the keyboard and parts operating in connection therewith, broken away in part.

Figure 4 is a detail bottom plan view of the keyboard locking slides, broken away in part.

Figure 5 is a section on the line 5—5, Figure 2, parts being broken away.

Figure 6 is a detail side view of a portion of the motor switch operating means, parts being broken away.

Figure 7 is a detail side view of further portions thereof, parts being broken away.

Figure 8 is a detail side view of a digital key, the slides engaging the key stem being shown in section.

In these drawings, the invention is shown as applied to a listing calculator of the Gardner type, disclosed in its essential features in the patent to Loring P. Crosman, No. 1,932,013, dated October 24, 1933.

General operation

As described in said patent, the digital keys 215 for each denominational order which are depressed to represent a value from one to nine, are latched in fully depressed position with the lower ends of the key stems located in the path of movement of the related teeth of the related differentially movable member or stop bar 615, thereby allowing said stop bars to advance a distance corresponding to the value of said keys upon operation of the machine. The depression of a digital key will also cam a slide 1 forwardly and remove a column latch 214 from the path of movement of the related stop bar 615, these latches preventing movement of a stop bar 615 and an actuator lever of any column in which no digital key is depressed.

A cycle of operation takes place as follows:

Depression of general operation key 114 trips a latch 112 to release clutch control lever 106, said lever being moved by its spring 111 out of engagement with the tail arm of clutch pawl 103, said pawl being pivoted or fulcrumed upon a stud of crank arm 105 of a shaft 105'. Said clutch pawl being thereby released will be rocked by its spring 2 into engagement with one of the circumferential notches of clutch disk 3, said disk having suitable drive connection with the motor 100. This clutch disk 3 forms one member of a clutch and said pawl 103 forms the other member thereof, and said clutch being rendered operative as stated the shaft 105' and its crank arm 105 will be driven, following the closing of the motor switch to be described as follows:

Pivotaly mounted upon stud 5 of the machine frame whereon clutch control lever 106 is fulcrumed is an arm 6, provided at its free end with an insulated roller 109 engaging one of the spring contacts of motor switch 107, said arm 6 having also at its free end a stud 7 located opposite to and spaced from roller 109, said stud being engaged by the clutch control lever 106, and as said lever is rocked as stated, said arm 6 will be rocked therewith, the roller 109 acting to close the contacts of switch 107, thereby initiating a cycle of operation.

During the cycle, a cam surface 115 of crank arm 105 will engage a roller 8 of clutch control lever 106 and restore said lever to normal position and re-engage it with the latch 112, said lever contacting the tail arm of clutch pawl 103, and rocking said pawl out of engagement with clutch disk 3, to render the clutch inoperative and complete the cycle.

The motor switch 107 is held closed during this action and until the end of the cycle by means described as follows:

Crank arm 105 imparts oscillatory movement through link 108 to pivoted arm 316, the latter having link connection 9 with pivoted arm 327 to oscillate the latter in unison therewith. The arm 327 normally has engagement with a spring tensioned finger 10, pivoted on the aforesaid frame stud 5, the free end of said finger engaging said roller 109, of the arm 6.

During a cycle of operation, the arm 327 is carried away from said finger 10, allowing the latter under the influence of its spring 11 to follow the roller 109 in its aforesaid movement, thereby holding the switch contacts closed during the restoration of the clutch control lever 106 and until the end of the cycle, when the arm 327 will re-engage said finger 10 and restore it to normal position against the tension of its spring, thereby permitting the spring contacts of the said switch to open.

Means for disabling the cycle operating mechanism

Means are provided for holding the digital keys in partially depressed position and for holding the aforesaid clutch inoperative and the aforesaid motor switch open, notwithstanding the depression of the general operation key 114, said means being described as follows:

For each denominational column of digital keys 215 is provided a longitudinal slide 12, similar to the slide 1, and normally urged by its spring 13 against the forward edges of the key stems beneath cam portions 21 of said stems to hold said keys in normal raised position.

A transverse slide 15 is provided with a plurality of teeth 15', one tooth for each denominational column, and the slide 12 of each said column is provided at one end thereof with a lateral projection 14, normally located adjacent to but out of the path of movement of slide 15. Slide 15 has a rearward extension 16, provided with a notch engaged by one arm of a bell lever 17, as seen in Figure 3, said bell lever being fulcrumed at 18 to a stationary framing bracket 19, and having link connection 20 with a forward extension of the clutch control lever 106.

During the depression of a digital key 215 of any column, the related slide 12 will be cammed forwardly to bring said lateral projection 14 of the slide into the path of movement of the related tooth of said transverse slide 15, thereby holding the clutch control lever 106 against operation to disable the cycle operating mechanism. At the end of a full stroke of the digital key, the slide 12 will be released from the cam portion 21 of the key stem and moved rearwardly by its spring 13 until stopped by the stem of the key, coming to rest above the shoulder 22 of said cam portion and thereby holding the key in fully depressed position, the lateral projection 14 of said slide 12 being at the same time moved out of the path of movement of the related tooth of slide 15, to thereby enable the cycle operating mechanism.

A partial depression of a digital key 215 will

likewise cam the related slide 12 forwardly and the key being prematurely released said slide will engage a notch 23 in said cam portion 21 of the key stem, thereby holding the key in partially depressed position, and as said movement of the slide 12 will bring its projection 14 into the path of the movement of the related tooth of slide 15, it will be so held.

The general operation key 114 being now depressed in an attempted initiation of an operating cycle of the machine, and the clutch control lever 106 being consequently tripped, said lever will be allowed to move only sufficiently to bring its upper lug 24 below the terminal lug of latch 112 to hold the latter in unlatched position, and due to the fact that the slide 12 has been previously moved as stated to bring its projection 14 into the path of movement of the related tooth of slide 15, said slight movement of the lever is limited, thereby preventing engagement of the clutch members 103 and 3 and also preventing the closing of the contacts of the switch 107, until the partially depressed digital key shall have been fully depressed.

The notch 23 of the cam portion of the key stem has an upper cam wall permitting further depression of said key to release slide 12 from said cam portion, whereupon slide 12 will be returned by its spring and engage the key stem above the shoulder 22 of said cam portion thereof to thereby hold said key in fully depressed position, the lateral projection 14 of the slide being at the same time moved out of the path of movement of the related tooth of the slide 15 to enable the cycle operating mechanism, whereupon the clutch control lever 106 will be rocked by its spring 111 to start the operating cycle of the machine and said lever being so rocked the slide 15 will be moved to bring its said teeth into the path of movement of the lateral projections 14 of the slides 12 to thereby hold all of the digital keys of all columns against depression during said operating cycle.

During this cycle, cam portion 115 to crank arm 105 will restore clutch control lever 106 as previously described, to thereby restore slide 15 to normal position prior to operation of the well-known keyboard clearing devices by arm 327.

Means for locking the keyboard during total operations

Depression of total key 278 imparts counter-clockwise movement to bell lever 29, fulcrumed at 206, and having one arm thereof engaging cam edge 30 (Fig. 5) of a transverse slide 28, to thereby move said slide endwise and bring the teeth 27 of the slide into the paths of movement of the projections 26 (Fig. 4) of all of the slides 1, to thereby lock said slides 1 against forward movement, thus locking the keyboard during total operations. Bell lever 29 being actuated as above stated, the other arm thereof actuates arm 29' pivoted at 206 to thereby impart a partial movement to clear-out bail 227 sufficient to release the column latches 214 from the stop bars 615.

Total key lock upon partial depression of a digital key

Means are provided under control of the digital keys and operable by a partially depressed digital key to lock the totals key against depression, so that a previously attempted registration must be completed before a total can be taken, this means being described as follows:

A digital key being partially depressed and pre-

maturely released, said key will be held in partially depressed position, and the general operation key 114 being then depressed in an attempted initiation of an operating cycle of the machine, the released clutch control lever 106 will be allowed a very limited movement and the clutch members 103 and 3 will be prevented from engagement and the contacts of the motor switch 107 will be prevented from closing until the partially depressed digital key shall have been completely depressed, as previously explained.

The partial depression of a digital key will cam the related slide 1 forwardly to bring the projection 26 of said slide into the path of movement of the related tooth 27 of the transverse slide 28, thereby locking the totals key against depression, so that said previously attempted registration must be completed before a total can be taken.

20 I claim:

1. In a key-set calculator including a plurality of columns of digital keys, register operating means including an electric motor, a normally open switch and differentially movable elements under control of said digital keys, and means including a manual key for accomplishing the closing of said switch; means displaceable to hold said digital keys in fully or partially depressed position, and means operable by the displaced holding means to hold said switch open notwithstanding the operation of said manual key when said digital keys are partially depressed.

2. In a key-set calculator including a plurality of columns of digital keys, register operating means including an electric motor, a normally open switch, a switch control lever and differentially movable elements under control of said digital keys, and means including a manual key for releasing said lever and accomplishing the closing of said switch; slide devices displaceable

to one position to hold said digital keys in fully depressed position, and displaceable to a second position to hold said digital keys in partially depressed position, and a slide device operable by any displaced holding slide to hold said switch open notwithstanding the operation of said manual key.

3. In a key-set calculator including a plurality of columns of digital keys, register operating means including an electric motor, a normally open switch and differentially movable elements under control of said digital keys, and means including a manual key and a normally restrained spring device releasable by said key to accomplish the closing of said switch; means operable to hold said digital keys in fully depressed position, and displaceable from normal position to hold said digital keys in partially depressed position, and means operable by the displaced holding means to hold said switch open notwithstanding the release of said spring device and releasable to accomplish the closing of said switch upon further depression of said digital keys.

4. In a key-set calculator including a plurality of columns of digital keys, register operating means including an electric motor, a normally open switch, a normally inoperative clutch and differentially movable elements under control of said digital keys, and means including a manual key for rendering said clutch operative and for accomplishing the closing of said switch; means operable to hold said digital keys in fully depressed position, and displaceable from normal position to hold said digital keys in partially depressed position, and means operable by the displaced operating means to hold said clutch inoperative and said switch open notwithstanding the operation of said manual key.

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