

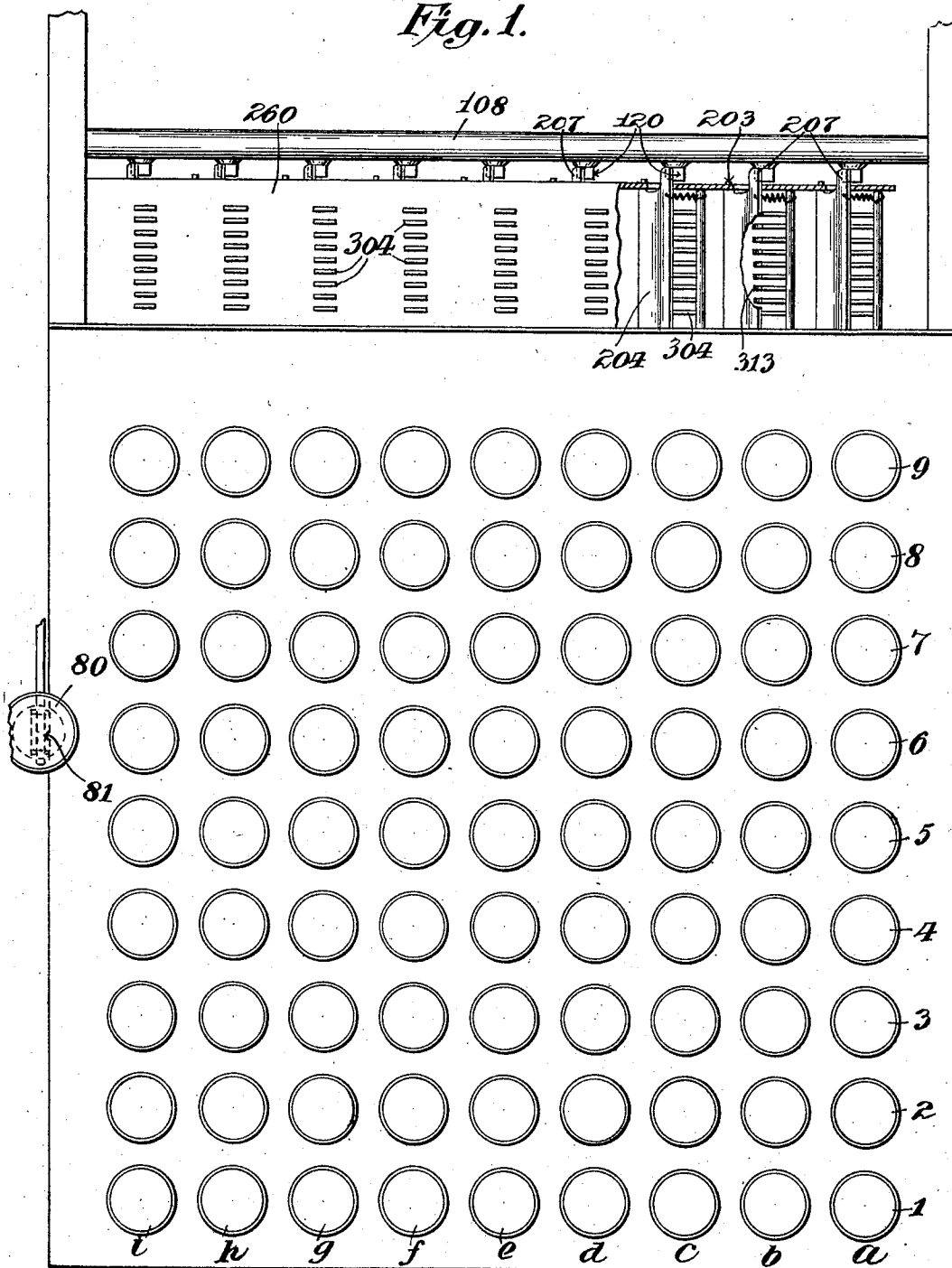
C. N. McFARLAND.
 KEYBOARD LOCKING MECHANISM FOR ADDING MACHINES.
 APPLICATION FILED SEPT. 24, 1906.

940,708.

Patented Nov. 23, 1909.

5 SHEETS—SHEET 1.

Fig. 1.



Attest:
Edgeworth
M. McFarland

Inventor:
 Charles N. McFarland
 by William R. Baird
 his Atty.

C. N. McFARLAND.
 KEYBOARD LOCKING MECHANISM FOR ADDING MACHINES.
 APPLICATION FILED SEPT. 24, 1906.

940,708.

Patented Nov. 23, 1909.

5 SHEETS—SHEET 2.

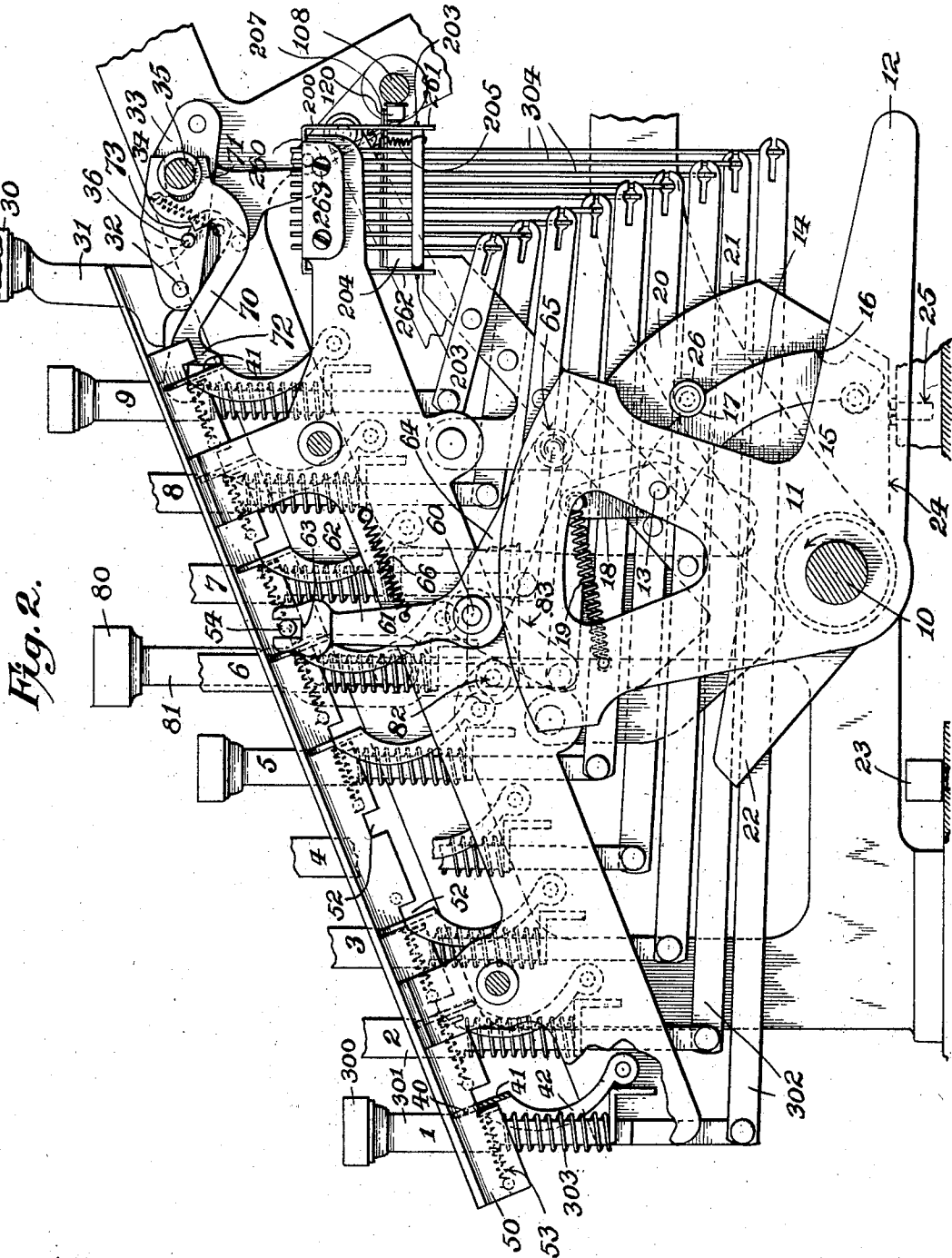


Fig. 2.

Attest:
Edgeworth & Co.
W. McFarland

Inventor:
 Charles N. McFarland
 by William R. Baird
 his Atty.

C. N. McFARLAND.
KEYBOARD LOCKING MECHANISM FOR ADDING MACHINES.

940,708.

APPLICATION FILED SEPT. 24, 1908.

Patented Nov. 23, 1909.

5 SHEETS—SHEET 3.

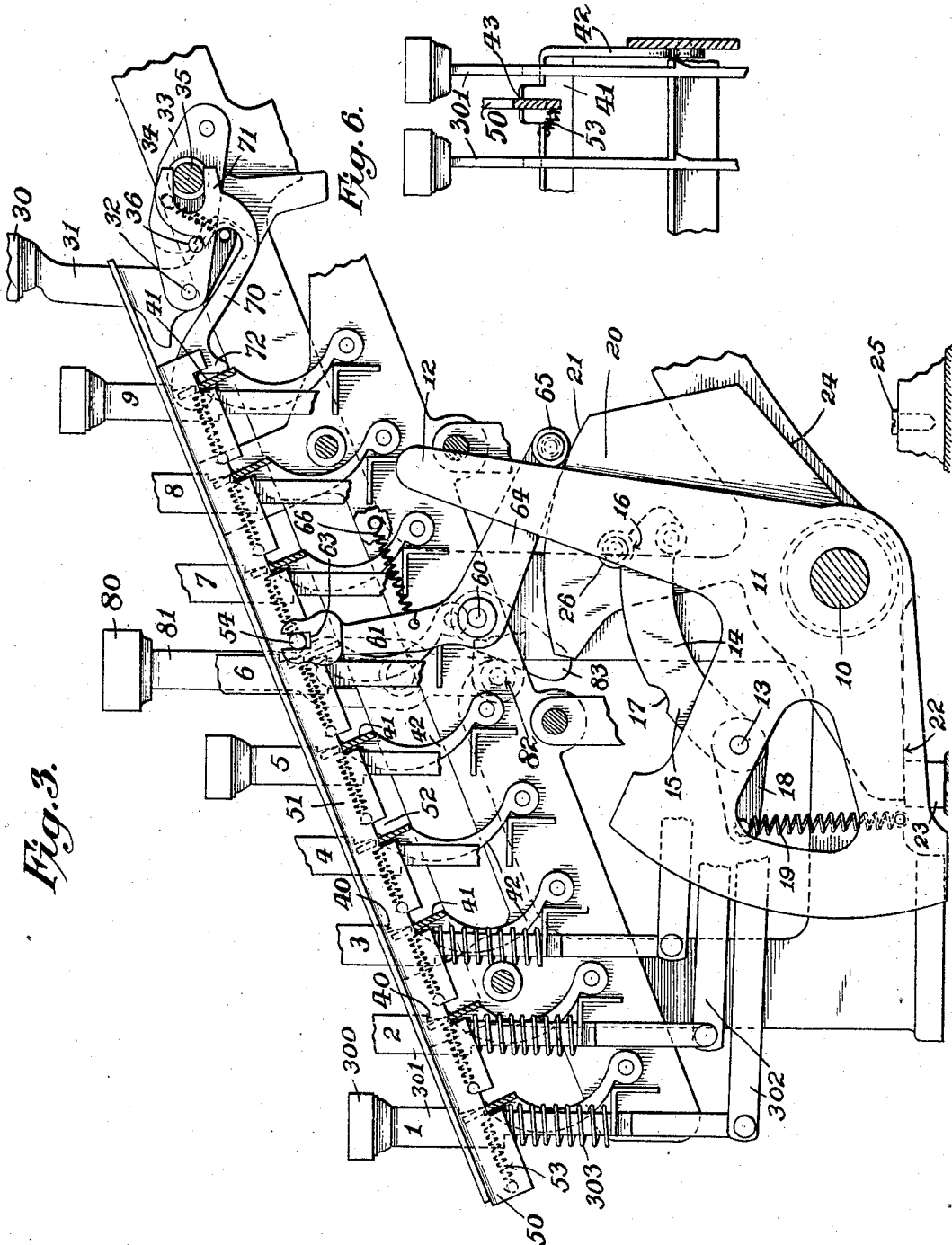


Fig. 3.

Fig. 6.

Attest:
Edgeworth
W. McFarland

Inventor:
Charles N. McFarland
by William R. Baird
his Att'y.

C. N. McFARLAND.
 KEYBOARD LOCKING MECHANISM FOR ADDING MACHINES.
 APPLICATION FILED SEPT. 24, 1906.

940,708.

Patented Nov. 23, 1909.

5 SHEETS—SHEET 4.

Fig. 4.

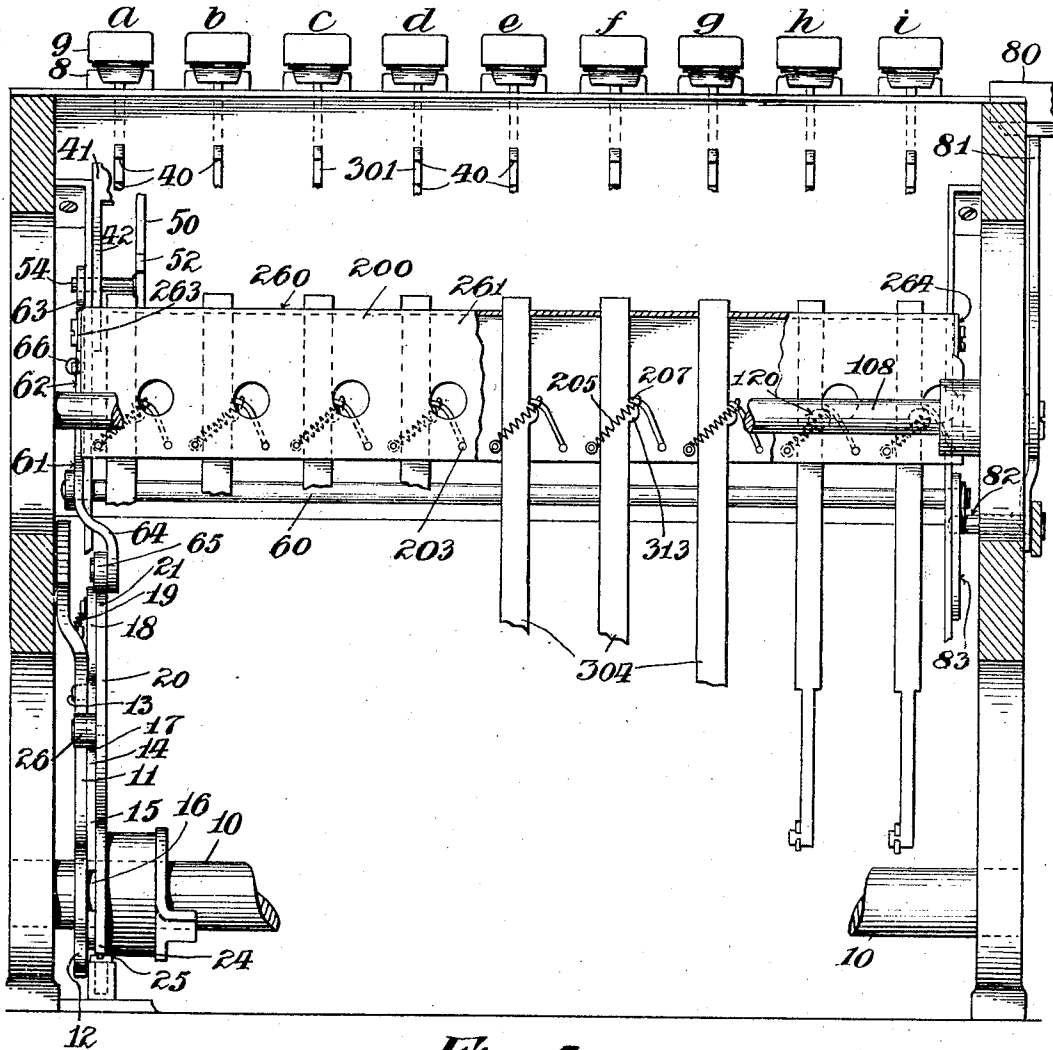
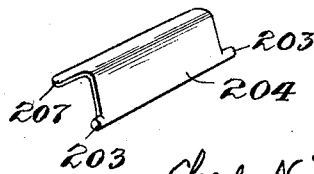


Fig. 5.



Attest:
Edgeworth
W. M. McFarland

Charles N. McFarland Inventor:
 by William R. Baird
 his Att'y.

C. N. McFARLAND.
 KEYBOARD LOCKING MECHANISM FOR ADDING MACHINES.
 APPLICATION FILED SEPT. 24, 1906.

940,708.

Patented Nov. 23, 1909.

6 SHEETS—SHEET 5.

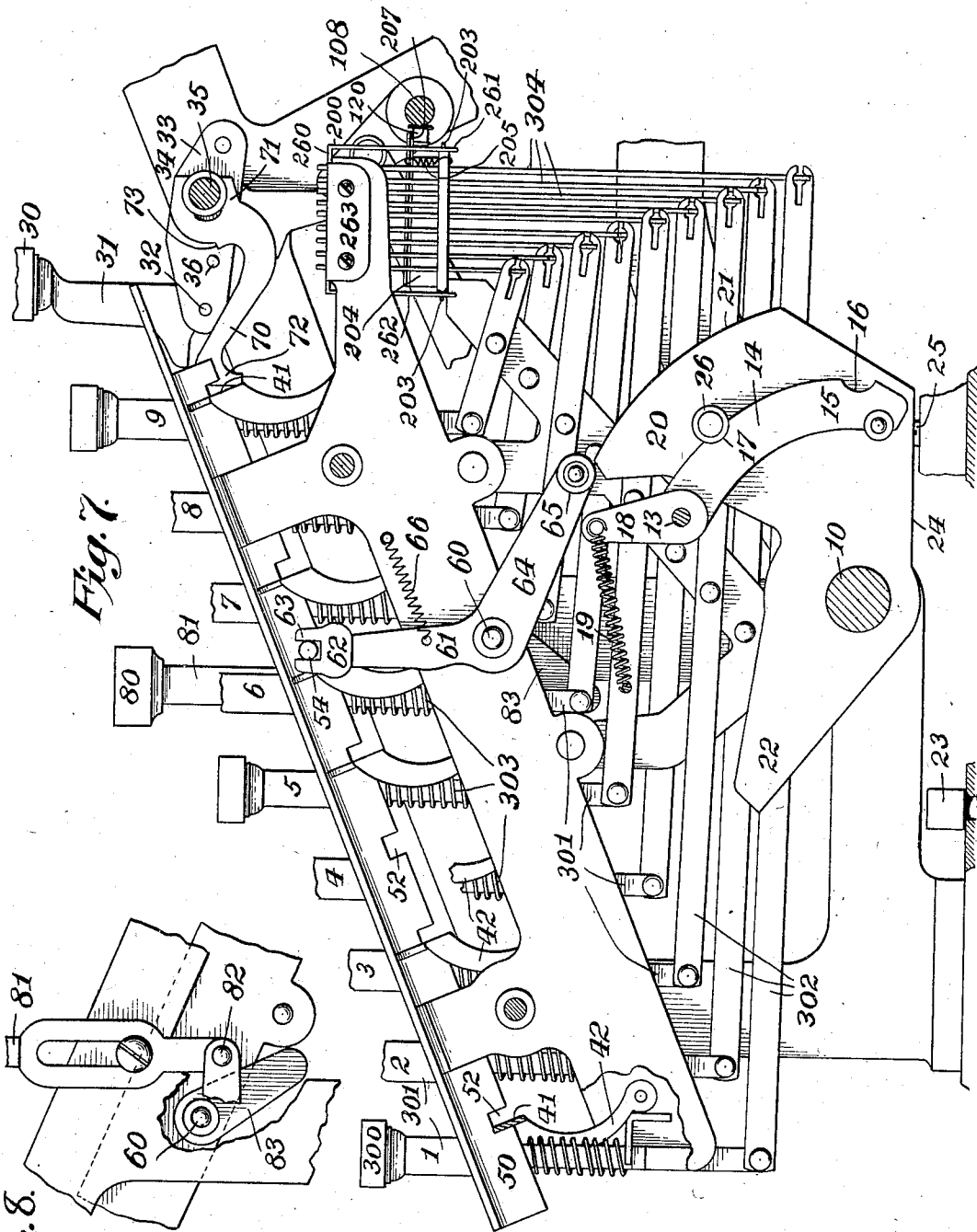


Fig. 8.

Attest:
 M. Brashears
 S. Brashears

Inventor:
 Charles N. McFarland
 by William R. Baird his Atty.

UNITED STATES PATENT OFFICE.

CHARLES N. MCFARLAND, OF KINGSTON, PENNSYLVANIA, ASSIGNOR TO THE ADDER MACHINE COMPANY, OF KINGSTON, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

KEYBOARD-LOCKING MECHANISM FOR ADDING-MACHINES.

940,708.

Specification of Letters Patent. Patented Nov. 23, 1909.

Application filed September 24, 1906. Serial No. 335,877.

To all whom it may concern:

Be it known that I, CHARLES N. MCFARLAND, a citizen of the United States, residing at Kingston, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Keyboard-Locking Mechanisms for Adding-Machines, of which the following is a specification.

My invention relates to adding machines and similar mechanisms and more particularly to the means employed to lock the keys against either accidental or intentional displacement after the oscillation of the actuating shaft if the machine has commenced or the total key has been depressed, especially in machines which embody the flexible or self-correcting key board.

Machines of this class have attained great perfection, they are adapted accurately to indicate and accumulate the items registered thereon and to record the items and totals. Accuracy having been secured, speed is the next desirable quality to be obtained.

Of course it always has been desirable to lock the keys against displacement after an item has been set thereon and mechanisms have been designed for that purpose, but these mechanisms within my experience have not been applicable to machines with the flexible key board, and where a motor is employed and speed of operation is desired do not permit of unlocking and restoring the keys early enough on the return stroke of the machine to enable the operator to begin the registration of a new item to save any time as compared with hand operating machines. This is a disadvantage which I have overcome in the mechanism about to be described and which is so arranged that not only are the keys instantly and automatically locked the moment the total key is depressed or the actuating shaft moved and locked merely as an incident of said movements, but they are unlocked at any predetermined point in the reverse motion of the actuating shaft and preferably at the beginning of such reverse movement or at such time as the keys are automatically restored by the usual means, so that the operator may at once begin to set up a new item on the keys just as soon as the position of the keys de-

termined by the previous items set up have performed their functions.

The machine in connection with which I desire to describe my invention is the one of the type known as the Wales adding machine, one form of which is described in Letters Patent of the United States 797,032, issued August 15, 1905.

In the drawings, Figure 1 is a top plan view of the key board of the machine and the relevant parts of the mechanism in the rear of the same; Fig. 2 is a side elevation and partial vertical section of the mechanism showing the keys unlocked; Fig. 3 is a similar view showing the keys locked; Fig. 4 is a rear view of the parts shown in Figs. 2 and 3; Fig. 5 is a detail perspective of one of the latches of a denominational series; Fig. 6 is a detailed elevation of some of the parts shown in Figs. 2 and 3; Fig. 7 is a side elevation and partial vertical section of parts of the machine and Fig. 8 is a detail view.

In the drawings, 10 is the actuating shaft of the machine journaled in suitable bearings and oscillated by a handle or in any other suitable manner. Rigidly secured to the shaft is a plate 11 having a terminal end 12 connected to other parts of the mechanism not necessary to be described. Pivoted to this plate at 13 is a connector 14 in the form of a bell crank lever having a downwardly curved member 15 provided with two notches 16 and 17 on its upper surface, and a straight member 18 shown projecting upwardly in Fig. 2. This lever is under tension of a spring 19 secured to the plate 11 and traveling with it. Loosely mounted on the same shaft 10 and immediately adjacent to the plate 11 is a lifter 20 consisting of a plate which is provided with a cam surface 21, a foot 22 adapted to coöperate with a stop 23 on the base of the machine, and a second foot 24 adapted to coöperate with a second stop 25, also on the base of the machine. Projecting outwardly from the surface of the plate 20 and over the arm 15 is a roller pin 26 adapted to engage with the notches 16 and 17.

The key board comprises a series of keys arranged in nine rows, each row representing a denomination—*a*, being cents; *b*,

tens of cents; *c*, dollars; *d*, tens of dollars; *e*, hundreds of dollars; *f*, thousands of dollars; *g*, tens of thousands of dollars; *h*, hundreds of thousands of dollars, and *i*, millions of dollars, and each row having nine keys numbered from 1 to 9 respectively. It also comprises an error key 30, the purpose of which will presently appear.

Each numeral key is provided with a finger piece or top 300, a key stem 301, a key lever 302, and a retracting spring 303. The key levers are adapted to elevate and depress a series of stops 304 to which they are secured at their lower ends and by their elevation to interpose the tops of the stops into the paths of reciprocating racks (not shown) which by connecting mechanism determine the position of the numeral wheels (not shown), and therefore the items to be accumulated.

An inverted U-shaped frame 200 consisting of a horizontal plate 260, two vertical plates 261 and 262 and two depending ears 263 and 264 is arranged across the machine and supported on the frame which supports the key stems, and is provided with suitable apertures to guide the stops 304 in their vertical reciprocation and to limit their lateral movement. The vertical plates 261 and 262 of this frame are apertured to provide bearings for pintles 203 of latches or broad pawls 204, which latter are nine in number, one for each denominational series. These latches are normally pressed against the stop 304 above cam lugs 313 with which the stops are provided, by means of springs 205, the other ends of which are secured to rods rigidly mounted on the U-shaped frame 200 and which rods also serve to hold the parts of the frame rigidly together. The cam lugs 313 are all of the same height, and each latch 204 presses against all of the stops 304 of its series just above these lugs when the keys are undepressed. Each latch 204 is provided with a trip ear 207 extending outside of the U-shaped frame 200.

It is obvious that when the key stems are undepressed that any one of the stops 304 may be elevated to pass the latch 204 of the denominational series of which that particular stop forms a part, because the latch yields against the tension of its spring for that purpose, but that after such stop has acquired its new position with its cam lug 313 above the latch 304 that such stop cannot be dropped and restored to its original position unless its latch 204 is moved from beneath its cam lug by some positive means. Such means is found in the shaft 108 which is provided at suitable intervals corresponding to the positions of the several latches and directly under their respective ears 207 with pins 120 which are adapted to engage such trip ears to move the latches 204 when the shaft 108 is rocked or oscillated.

It will readily be understood that if any key be depressed, depressing another key in the same denominational series will at once and automatically restore the first named key to its original independent position, because depressing any key of a series lifts its corresponding stop, 304, which, acting through its cam lug 313, moves its latch 204 common to all the keys of its denominational series; and, as soon as this latch has been moved away from its stops, any stop which has been lifted is at once retracted downward under the influence of its spring 303. Thus the key board may be said to be "flexible" or "self-correcting" because depressing any key in a denominational series at once and automatically restores any other key in the same series which has previously been depressed.

Each key stem 301 is provided with notches 40 40, corresponding respectively to the depressed and undepressed positions of the keys. Across each horizontal row of keys is a transverse lock bar or stop 41, each bar being provided with two downwardly projecting arms 42, 42, pivoted at their lower extremities to the key board frame. Each bar is vertically slotted at 43 (see Fig. 6) near one of its ends, all of the slots 43 being in substantially the same vertical plane.

A coupling piece 50 comprising a long bar provided with notches 52, 52 is suspended in the slots 43 so that its movement in one direction will move all of the lock bars 41 simultaneously in that direction. Each lock bar 41 is connected to the coupling piece 50 by a spring 53 which holds the bar 41 against the front side of its notch 52. On the side of the coupling piece 50 is a projecting pin 54.

Mounted on the key board frame is a rock shaft 60 to which is secured a lock lever 61 in the form of a bell crank, one of its arms 62 terminating in a fork 63 adapted to engage with the pin 54 and its other arm 64 being provided with a roller 65 adapted to cooperate with the cam face 21 of the lifter 20. This lever is normally under tension of a spring 66, one end of which is secured to the key board frame.

30 indicates the error key provided with a dependent stem 31 and pivoted at 32 to one arm 33 of a rocking plate 34 which oscillates on the shaft 35, and is provided with a stop pin 36. A goose neck link 70 is loosely hung on the shaft 35 by a fork 71 which embraces the shaft and on the uppermost bar 41 by a fork 72. It is provided with a shoulder 73 which is adapted to cooperate with the pin 36. This key is connected by intermediate mechanism (not shown) to the rock shaft 108.

80 is a total key having a dependent stem 81 and provided with a projecting pin 82.

Rigidly secured to the rock shaft 60 and in the vicinity of the total key stem is an arm 83. When the total key is depressed the pin 82 moving against the arm 83 locks the shaft 60 and connected mechanism against further movement with the result referred to hereafter.

The total key is adapted to secure, through appropriate mechanism the registration and record of the total of the items accumulated in the machine.

The operation of the parts is as follows:—
Supposing that an item has been set up in the machine by the depression of the proper keys and that the actuating shaft has commenced its oscillation forward, and the parts are in the position shown in Fig. 2, this movement swings the plate 11 toward the front of the machine carrying with it the connector 14, and, because of the engagement of the roller pin 26 on the lifter 20 with the notch 17 of the connector 14, moves the edge 21 of the lifter against the roller 65 on the lower end of the locking lever 61, and, oscillating this lever and its shaft 60, moves the fork 63 against the pin 54 of the coupling piece 50 and slides the latter forward carrying with it all of the lock bars 41. Each one of these is held against the forward wall of its notch 52 by its spring 53 until the lock bars engage with the notches 40 in the key stems 301. Any further movement of the coupling piece 50 simply stretches the springs 53 and does not affect the lock bars which remain abutting against the key stems. The notches 52 in the coupling piece are so constructed as to allow certain play or freedom of movements which obviates the necessity of an extremely fine adjustment of the parts. In the meantime the forward oscillation of the shaft 10 and plate 11 has continued and moved the lifter 20 with it until its foot 22 has reached the stop 23 when it can go no farther. The oscillation of the shaft 10, however, continues beyond this point in the ordinary operation of the machine. This movement carries with it the plate 11 and, the connector 14 being secured to it, must move with it. Such movement disengages the notch 17 from the roller 26, and as the connector can swing on its pivot 13 against the tension of the spring 19, the connector moves past the roller leaving the lifter 20 at rest until, at the end of the stroke of the plate 11, the notch 16 on the connector 14 registers with and engages the roller 26 (as shown in Fig. 3), thus forming a slipping connection between the plate 11 and the lifter 20. Upon the reverse oscillation of the shaft 10, the engagement of the notch 16 with the roller pin 26, at the beginning of the stroke, carries the lifter 20 in the reverse direction until the foot 24 strikes against the stop 25. At this point the edge

21 of the lifter 20 is disengaged from the roller 65 of the lock lever 61 and the spring 66 retracts the lock lever to move the coupling piece 50 to its initial position and unlocks all of the keys. This operation of unlocking the keys, it will be observed, has taken place before the shaft 10 has completed its reverse stroke, so that a new item may be set up on the keys while such stroke is being completed. As the plate 11 continues to oscillate, in order to finish its stroke, the connector 14, moving with it, causes the notch 16 to become disengaged from the roller 26 which is now stationary, and swings the connector 14 on its shaft 13, stretching the spring 19, to permit the connector to pass the roller 26 until its notch 17 engages therewith, when the parts are in position for a new stroke.

When a series of items have been enumerated and accumulated in the mechanism and the total key 80 is depressed to operate in the usual manner, the pin 82 on its stem 81 moves against the arm 83 and rocks the shaft 60 to move the lock lever 61 and connected mechanism as before stated locking the keys independent of the mechanism heretofore described. When the actuating shaft 10 is thereafter oscillated the connector 14 is at once moved to the position shown in Fig. 3, but the parts are unlocked on the reverse oscillation of the shaft as before.

The error key 30 is connected by intermediate mechanism to the rock shaft 108 in such a manner that when the key is depressed it rocks this shaft 108 to restore the keys which have been depressed to indicate an item to their original undepressed condition so that if a digit has been wrongly struck the keys are put into a position to indicate the correct item, wiping out the error.

It is obviously desirable to lock the error key as well as the numeral keys through the mechanism above described. This is accomplished through the goose neck link 70 which, when the coupling piece 50 is slid forward and the uppermost bar 41 moves, is moved forward until its shoulder 73 is brought under the stop pin 36 to prevent the depression of the key stem 31 as shown in Fig. 3. The reverse motion of the coupling piece 50 disengages the shoulder 73 and pin 36.

By changing the position of the notch 17 in the connector 14, the time of unlocking the keys may be changed; so that the point of the oscillatory arc of the operating shaft where this unlocking occurs may be predetermined.

I claim—

1. In a calculating machine, comprising an actuating shaft and numeral keys arranged in denominational series having de-

pendent stems, the combination of said keys having notches on their stems corresponding to their undepressed position with a series of lock bars, each one of which is adapted to engage the notches of all of the keys of the same ordinal in all of the denominational series and a coupling piece adapted to move all of said lock bars simultaneously.

2. In a calculating machine, comprising an actuating shaft and numeral keys arranged in denominational series having dependent stems, the combination of said keys having notches on their stems corresponding to their undepressed position with a series of lock bars, each one of which is adapted to engage the notches of all of the keys of the same ordinal in all of the denominational series, and a coupling piece adapted to move all of said lock bars simultaneously and means for automatically shifting said coupling piece at predetermined points in the actuation of the shaft.

3. In a calculating machine, comprising an actuating shaft and numeral keys arranged in denominational series having dependent stems, the combination of said keys having notches on their stems corresponding to their undepressed position with a series of lock bars, each one of which is adapted to engage the notches of all of the keys of the same ordinal in all of the denominational series, and a coupling piece adapted to move all of said lock bars simultaneously and means for automatically shifting said coupling piece at predetermined points in the actuation of the shaft and keeping it in its shifted position during a predetermined time in the actuation of the shaft.

4. In a calculating machine, comprising an actuating shaft and numeral keys arranged in denominational series having dependent stems, the combination of said keys having notches on their stems corresponding to their undepressed position with a series of lock bars, each one of which is adapted to engage the notches of all of the keys of the same ordinal in all of the denominational series, a coupling piece adapted to move all of said lock bars simultaneously and a lock lever connected to said coupling piece adapted to be operated by the actuating shaft.

5. In a calculating machine, comprising an actuating shaft and numeral keys arranged in denominational series having dependent stems, the combination of said keys having notches on their stems corresponding to their undepressed position with a series of lock bars, each one of which is adapted to engage the notches of the keys of the same ordinal in all of the denominational series, a coupling piece adapted to move all of said lock bars simultaneously and intermediate mechanism between it and the oscillating shaft whereby the oscillation of said shaft shifts the coupling piece.

6. In a calculating machine, comprising an actuating shaft and numeral keys arranged in denominational series having dependent stems, the combination of said keys having notches on their stems corresponding to their undepressed position with a series of lock bars, each one of which is adapted yieldingly to engage the notches of all of the keys of the same ordinal in all of the denominational series, a coupling piece adapted to move all of said lock bars simultaneously.

7. In a calculating machine, comprising an actuating shaft and numeral keys arranged in denominational series having dependent stems, the combination of said keys having notches on their stems corresponding to their undepressed position with a series of lock bars, each one of which is adapted yieldingly to engage the notches of the keys of the same ordinal in all of the denominational series, and a coupling piece adapted to move all of said lock bars simultaneously and means adapted to hold said lock bars out of engagement with the key stems while the actuating shaft of the machine is at rest.

8. In a calculating machine, comprising an actuating shaft and numeral keys arranged in denominational series having dependent stems, the combination of said keys having notches on their stems corresponding to their undepressed position with a series of lock bars, each one of which is adapted yieldingly to engage the notches of all of the keys of the same ordinal in all of the denominational series, a coupling piece adapted to move all of said lock bars simultaneously, means adapted to hold said lock bars out of engagement with the key stems while the actuating shaft of the machine is at rest and further means set in operation by the movement of said actuating shaft to move the lock bars into said engagement.

9. In a calculating machine having a series of numeral keys and an oscillatory actuating shaft, bars each locking all of the keys of the same ordinal in all of the denominational series; and a lock lever for actuating the locking bar, the combination with means adapted to move the lever into a position to lock all of the keys simultaneously with the initial oscillation of the shaft, of means for maintaining it in said position during the forward oscillation of the shaft and means for restoring it to its original position during the rearward oscillation of the shaft.

10. In a calculating machine having a series of numeral keys and an oscillatory actuating shaft, locking bars for the keys each locking all of the keys of the same ordinal in all of the denominational series, and a lock lever for actuating the locking bar, the combination therewith of means adapted to move the lever into a position to lock the keys simultaneously with the initial oscillation

tion of the shaft, means for maintaining it in said position during the forward oscillation of the shaft and means for restoring it to its original position simultaneously with the initial reverse oscillation of the shaft.

11. In a calculating machine having a series of numeral keys and an oscillatory actuating shaft, a locking mechanism for the keys and a lock lever for actuating the same, the combination with means adapted to move the lever into a position to lock the keys simultaneously with the initial oscillation of the shaft, of mechanism for moving the lock lever comprising a lifter, means for moving the lifter without acting on the locking lever, means for holding the lifter at rest a predetermined time and means for thereafter disengaging the lifter from the lock lever.

12. In a calculating machine having a series of numeral keys and an oscillatory actuating shaft, a locking mechanism for the keys and a lock lever for actuating the same, the combination with means adapted to move the lever into a position to lock the keys simultaneously with the initial oscillation of the shaft, of mechanism for moving the lock lever comprising a sector loosely mounted on the shaft and means for oscillating it during a portion of the movement of the shaft in one direction and a slipping connection between it and the shaft permitting it to remain at rest during the remainder of said movement.

13. In a calculating machine having a series of numeral keys and an oscillatory actuating shaft, a locking mechanism for the keys and a lock lever for actuating the same, the combination with means adapted to move the lever into a position to lock the keys simultaneously with the initial oscillation of the shaft, of mechanism for moving the lock lever comprising a sector loosely mounted on the shaft, a member oscillating with the shaft and a connector between it and the sector which moves the sector during the initial turn of its oscillation in either direction and slips by the same during the remaining portion of each oscillation.

14. In a calculating machine having a series of numeral keys and an oscillatory actuating shaft, a locking mechanism for the keys and a lock lever for actuating the same, the combination with means adapted to move the lever into a position to lock the keys simultaneously with the initial oscillation of the shaft, of mechanism for moving the lock lever comprising a sector loosely mounted on the shaft, a member oscillating with the shaft and a connector between it and the sector which moves the sector during the initial turn of its oscillation in either direction and slips by the same during the remaining portion of each oscillation, comprising a pin on the sector and a yielding

member on the connector provided with a plurality of notches adapted to engage with the pin.

15. In a calculating machine having a series of numeral keys and an oscillatory actuating shaft, a locking mechanism for the keys and a lock lever for actuating the same, the combination with means adapted to move the lever into a position to lock the keys simultaneously with the initial oscillation of the shaft, of mechanism for moving the lock lever, comprising a sector loosely mounted on the shaft, a member oscillating with the shaft and a connector between it and the sector which moves the sector during the initial turn of its oscillation in either direction and slips by the same during the remaining portion of each oscillation, comprising a pin on the sector and a yielding member on the connector provided with a plurality of notches adapted to engage with the pin and an intermediate sliding surface engaging with said pins between the notches.

16. In a calculating machine having a series of numeral keys and an oscillatory actuating shaft, a locking mechanism for the keys and a lock lever for actuating the same, the combination with means adapted to move the lever into a position to lock the keys simultaneously with the initial oscillation of the shaft, of mechanism for moving the lock lever, comprising a sector loosely mounted on the shaft, a member oscillating with the shaft and a connector between it and the sector which moves the sector during the initial turn of its oscillation in either direction and slips by the same during the remaining portion of each oscillation and independent means for limiting the movement of the sector in either direction.

17. In a calculating machine having a series of numeral keys and an oscillatory actuating shaft, a locking mechanism for the keys and a lock lever for actuating the same, the combination with means adapted to move the lever into a position to lock the keys simultaneously with the initial oscillation of the shaft, of mechanism for moving the lock lever comprising a sector loosely mounted on the shaft, a member oscillating with the shaft and a connector between it and the sector which moves the sector during the initial turn of its oscillation in either direction and slips by the same during the remaining portion of each oscillation, comprising a pin on the sector and a yielding member on the connector provided with a plurality of notches adapted to engage with the pin and independent means for limiting the movement of the sector in either direction.

18. In a calculating machine having a series of numeral keys an oscillatory actuating shaft, a locking mechanism for the keys and a lock lever for actuating the same,

the combination with means adapted to move the lever into a position to lock the keys simultaneously with the initial oscillation of the shaft, of mechanism for moving the lock lever, comprising a sector loosely mounted on the shaft, a member oscillating with the shaft and a connector between it and the sector which moves the sector during the initial turn of its oscillation in either direction and slips by the same during the remaining portion of each oscillation, comprising a pin on the sector and a yielding member on the connector provided with a plurality of notches adapted to engage with the pin and an intermediate sliding surface engaging with said pins between the notches and independent means for limiting the movement of the sector in either direction.

19. In a calculating machine, comprising a series of numeral keys, an actuating shaft and locking mechanism for the keys includ-

ing a lock lever, automatic means for operating the lock lever brought into action by the movement of the shaft and manually operated means also adapted to operate the lock lever.

20. In a calculating machine, having a series of numeral keys, an actuating shaft, a locking mechanism for the keys comprising transverse locking bars, a longitudinal coupling piece and a lock lever, the combination therewith of means tending yieldingly to draw the lock lever to an unlocking position and positive means moving it in the reverse direction to an unlocking position operated by the actuating shaft.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES N. McFARLAND.

Witnesses:

HUBBARD B. PAYNE,
WILLIAM R. BAIRD.