C. V. WILGUS.

KEYBOARD FOR CALCULATING MACHINES.

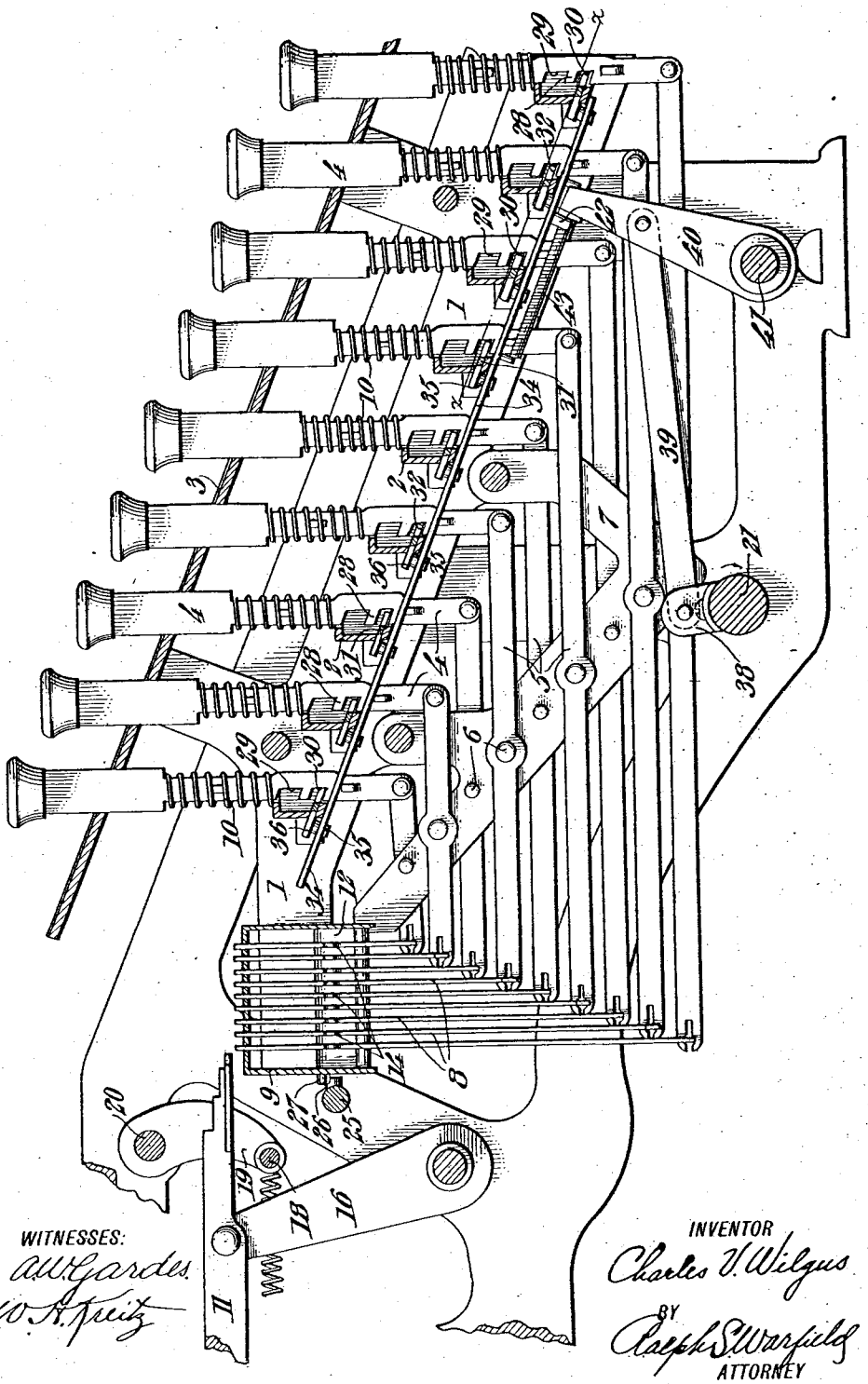
APPLICATION FILED OCT. 16, 1911.

1,066,690.

Patented July 8, 1913.

7 SHEETS—SHEET 1.

Fig. 1



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7 SHEETS—SHEET 2.

Fig. 2

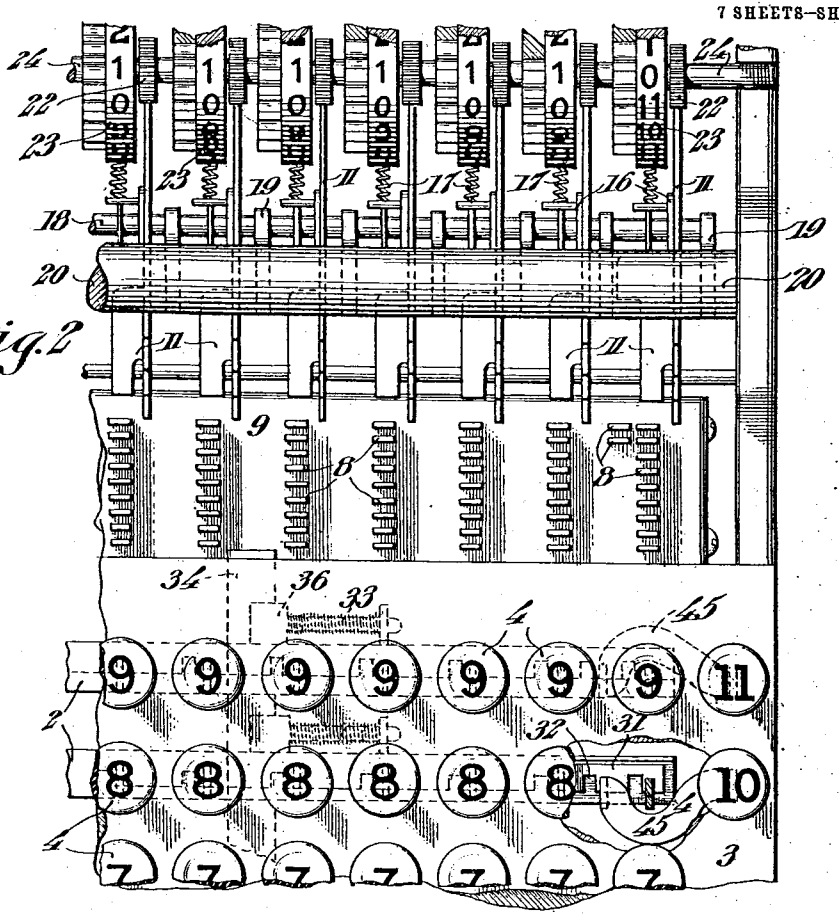
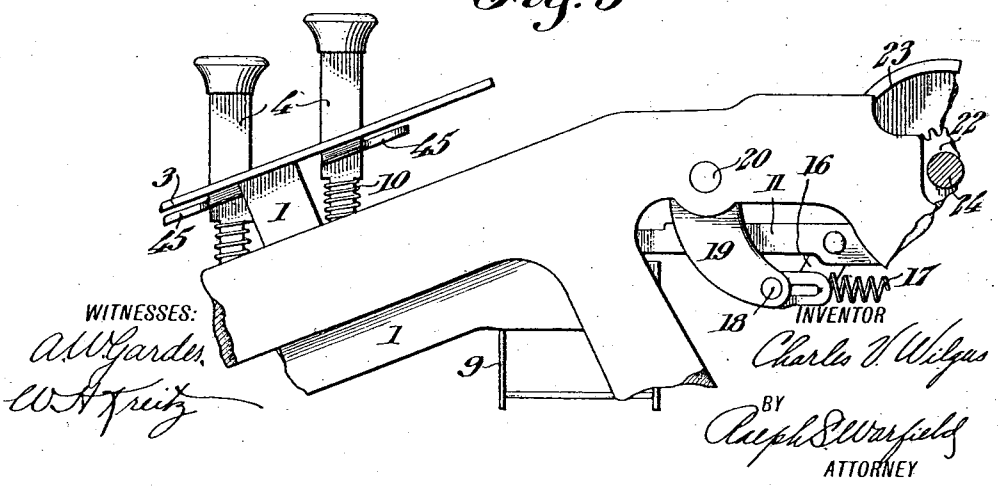


Fig. 3



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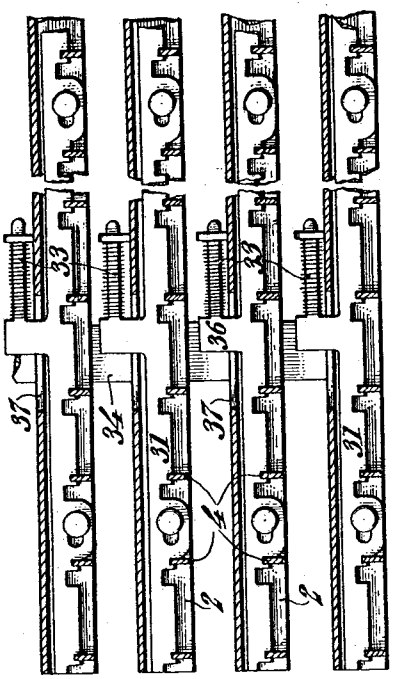


Fig. 7

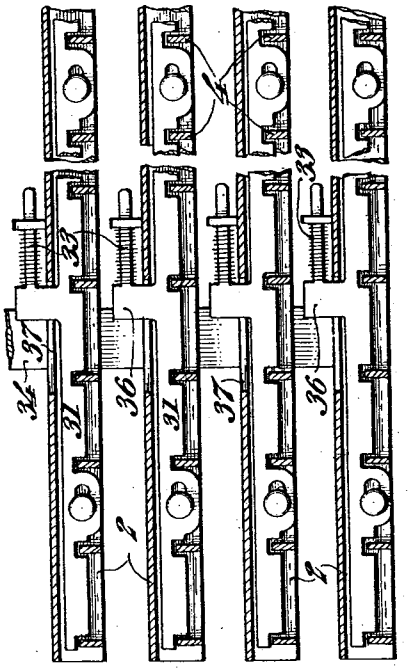


Fig. 5

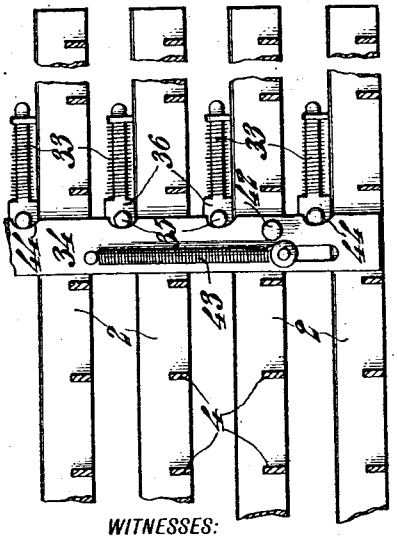


Fig. 6

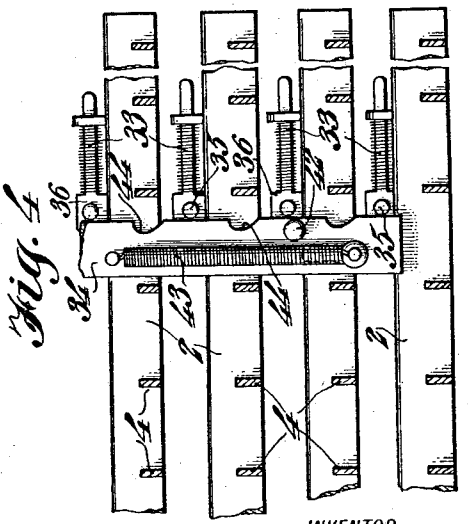


Fig. 4

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7 SHEETS—SHEET 4.

Fig. 9

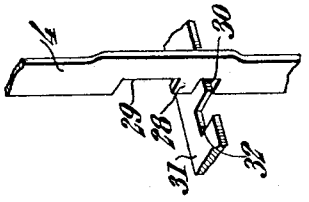


Fig. 10

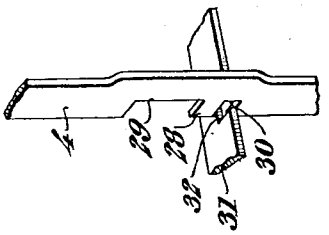


Fig. 8

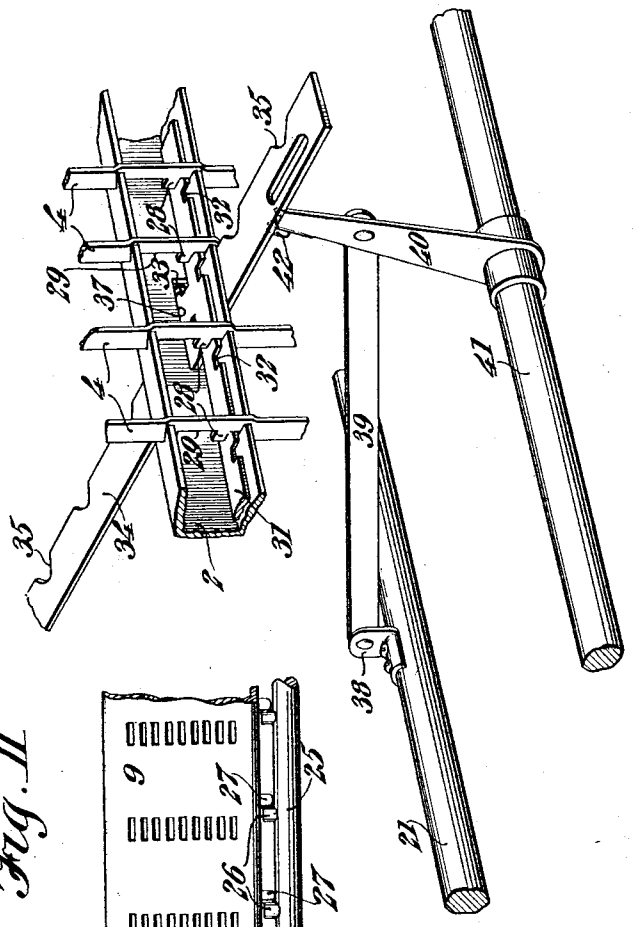


Fig. 11

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7 SHEETS—SHEET 5.

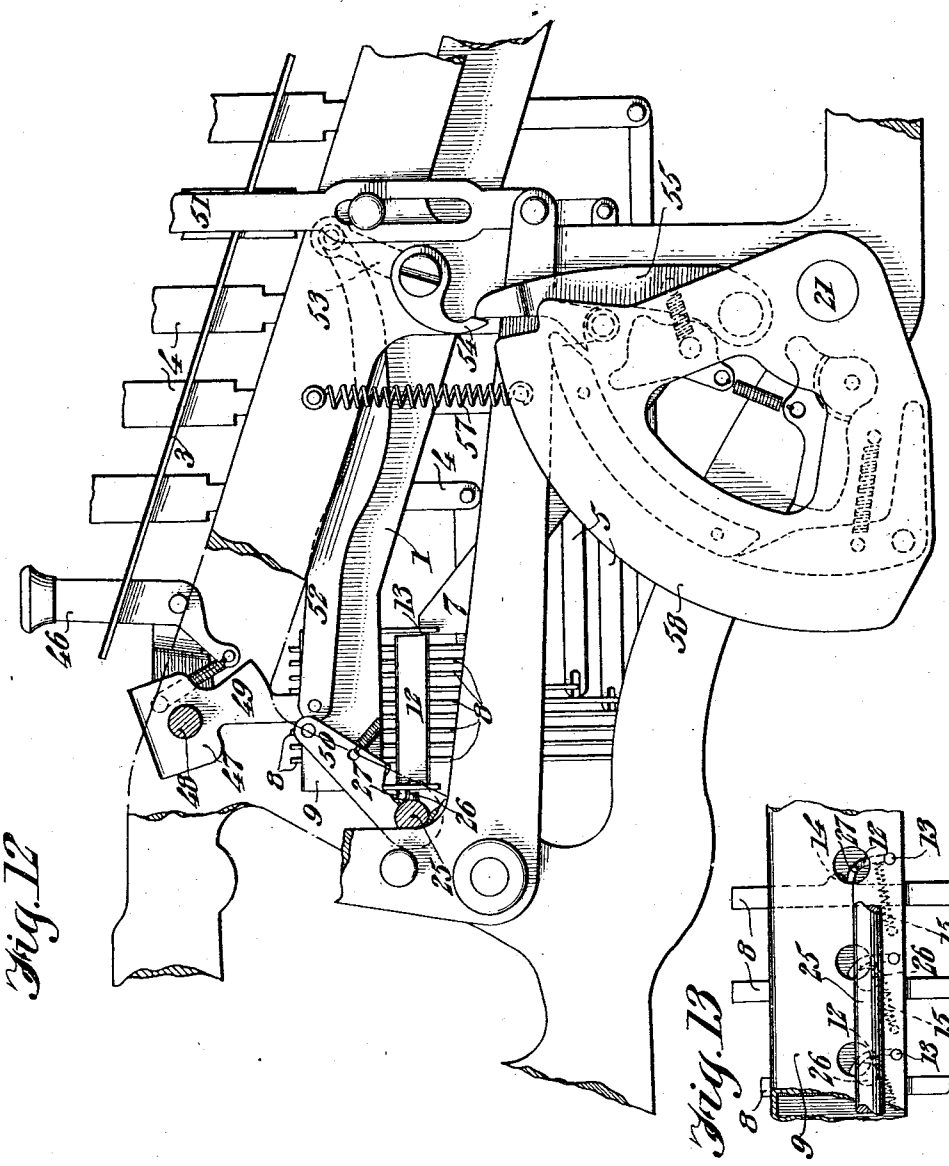


Fig. 12

Fig. 13

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7 SHEETS—SHEET 6.

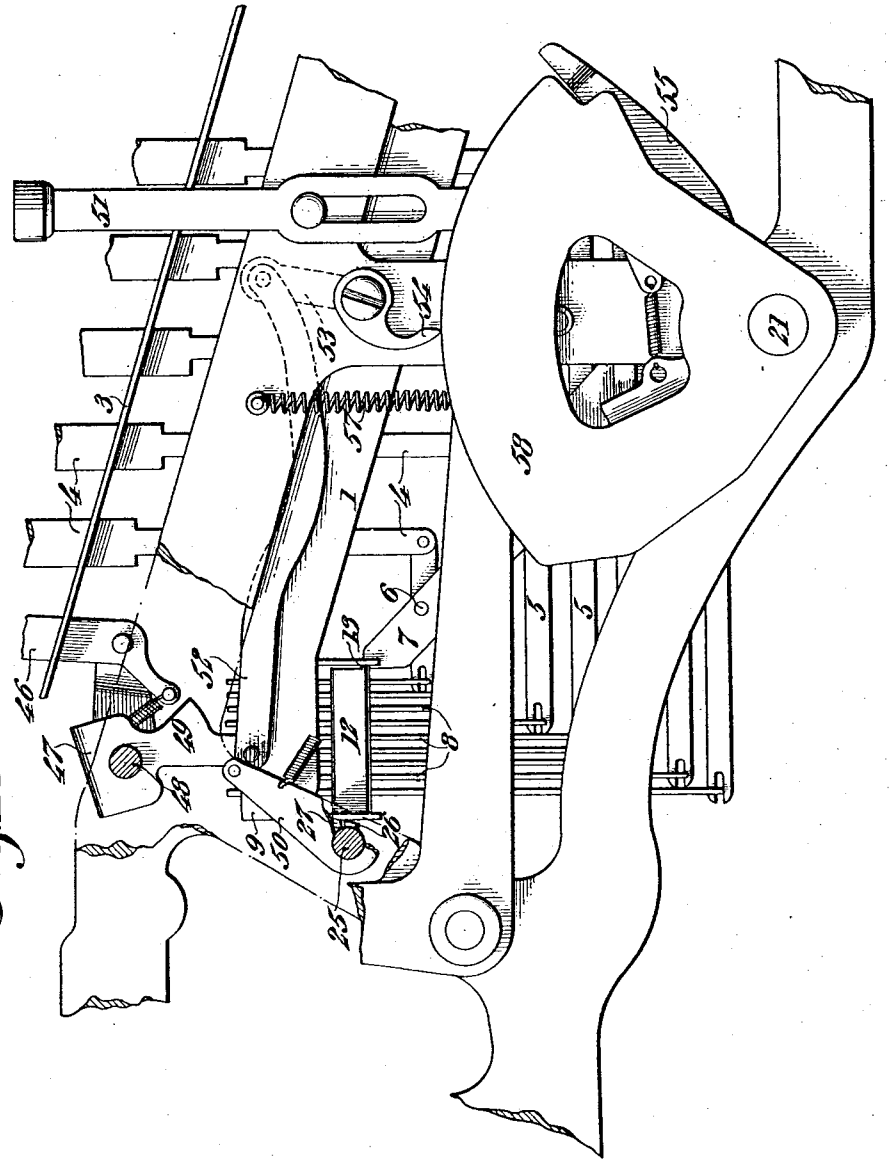


Fig. 14.

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7 SHEETS—SHEET 7.

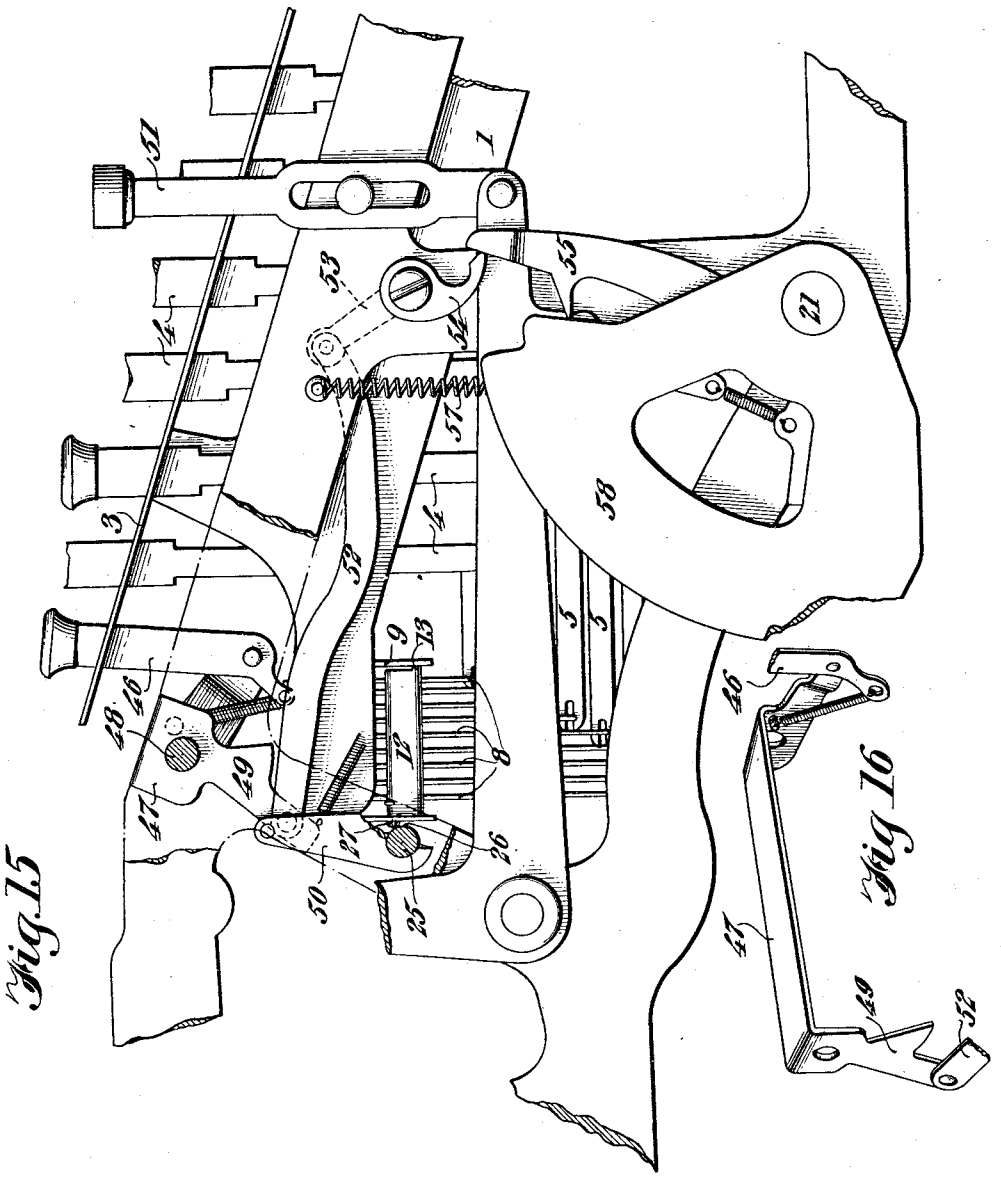


Fig. 15

Fig. 16

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KEYBOARD FOR CALCULATING-MACHINES.

1,066,690. Specification of Letters Patent. Patented July 8, 1913.

Application filed October 16, 1911. Serial No. 655,014.

To all whom it may concern:

Be it known that I, CHARLES V. WILGUS, a citizen of the United States, residing at Kingston, Luzerne county, Pennsylvania, have invented new and useful Improvements in Keyboards for Calculating-Machines, of which the following is a specification.

This invention relates to calculating machines and constitutes an improvement on United States patent to McFarland, #940,708 dated Nov. 23, 1909.

It is often desirable after an amount is set up on a keyboard, to lock all the keys, against operation during the turning of the main drive shaft, to prevent attempted changes or corrections in the amount set up, because such attempts are liable to cause an inaccurate registration, and may operate to scatter the type and impair the appearance of the work. In the locking keyboard disclosed in patent above referred to, swinging lock bars extend transversely of the keyboard and are connected by a coupling piece controlled by an angle lever, whose free end is wiped by a cam operated by the main drive shaft. The lock bars are normally held idle by a spring which is overcome by the cam when the drive shaft is operated, to enable the lock bars to rock into one or another of two notches near the upper end of each key and respectively located opposite said bars in either the normal or depressed positions of said keys. Said lock bars operate at the outset of the initial stroke of the shaft, to hold the keys against depression, and are returned to idle position by the restoring spring as the shaft releases the cam from the angle lever at the completion of its return stroke. To prevent the operation of the usual correcting key after the shaft has started on its operating stroke, the patent above referred to discloses a link connected to and operated by one of the lock bars, said link having a shoulder which, when the drive shaft starts on its initial stroke, enters the path of a stop on the usual tilting frame rocked by the correcting key to prevent the operation of the key.

In former constructions with which I am familiar, the keys may be locked in depressed position in such manner as to prevent their return by the depression of another key in the same bank, prior to turning the drive shaft, or if the flexibility of the keyboard is preserved prior to turning the shaft, then the keyboard is subject to "manipulation," that is, the forcible restoration of the depressed keys by pulling upwardly thereon, notwithstanding the locking mechanism.

One object of the present invention is to improve and simplify combined flexible and locking keyboards, so that the advantages of a flexible keyboard are preserved up to that point in the operation of the machine wherein manipulation of the keys might result in false registrations or improper listing of amounts, at which point the keys are firmly locked against forcible depression and restoration. Thus, after the operation of the machine has passed that point at which manipulation of the keyboard might result in an erroneous registration, a depressed key cannot be restored, nor can any key in normal position be depressed.

Still another object is to simplify and improve the means for locking the correcting key, to prevent depression thereof during the operation of the main drive shaft.

Other objects and advantages will be more fully explained hereinafter and particularly pointed out in the claims.

In the accompanying drawings Figure 1 is a longitudinal sectional view through a flexible keyboard embodying generally, the well-known Wales construction, equipped with the present invention. Fig. 2 is a fragmentary plan, partly broken away, showing the invention applied to a special keyboard. Fig. 3 is a detail side view, of the same. Fig. 4 is a fragmentary bottom plan of the keyboard, showing the restoring member in normal or effective position. Fig. 5 is a fragmentary sectional view on line X—X of Fig. 1, showing the locking bars in normal position, with the keys free to operate. Fig. 6 is a bottom plan corresponding to Fig. 4, showing the restoring member shifted to permit the locking bars to lock the keys. Fig. 7 is a sectional view corresponding to Fig. 5, showing the latches in locked position. Fig. 8 is a detail perspective, showing the locking mechanism for the keys. Fig. 9 is a detail perspective, showing the relation of a key and locking bar, when the latter is locked. Fig. 10 is a similar view, showing the key free to operate. Fig. 11

is a detail plan of the stop housing, showing the means for releasing the keepers. Fig. 12 is a side view, partly broken away, showing one means to lock the correcting key against operation, the mechanism being illustrated in normal position, and the total key depressed. Fig. 13 is a detail view, of the key-operated stops, the keepers for holding them effective, and the tripping shaft. Fig. 14 is a view similar to Fig. 12, showing the correcting key locked against operation. Fig. 15 is a similar view, showing the correcting key in operation. Fig. 16 is a detail perspective of the rocking or tilting frame controlled by the correcting key.

Although this invention is, for convenience, illustrated in connection with the keyboard section of a well-known Wales calculating machine, its use is not confined to that type of machine.

The key section shown, comprises side frames 1. 1 (Fig. 1), connected by a stepped series of slotted cross-braces 2. 2 and supporting an apertured guide plate 3. Spring-returned keys 4 arranged in rows or banks, pass down through the apertures in the guide plate and cross braces, with their lower ends depending below said braces and connected to levers 5 pivoted at 6 to hangers 7 secured to the side frames. Said levers carry stops 8, the upper ends of which enter and project above a casing or housing 9 secured to rear extensions of the side frames 1. 1. The stops for each bank of keys are arranged in a row, one behind the other. Depressing a key 4 against its spring 10 rocks its lever 5 to project its stop 8 into the path of a register-driving rack 11. Spring-pressed latches or keepers 12 (Fig. 13) swinging on pintles 13, extend across the housing adjacent each row of stops 8. When any one of the stops 8 is projected, a lug 14 thereon, normally lying below the keeper, presses the latter aside so as to pass, after which said keeper is snapped back by its spring 15 to catch beneath the lug and hold the stop in effective position relatively to the driving racks, against the tension of the key spring 10. This arrangement operates to make the keyboard flexible because, in case the wrong key in a bank has been depressed, the error is easily corrected by depressing the desired key in that same bank, the operation of which rocks the keeper aside, as above explained, thereby releasing the lug 14 of the key stop erroneously projected, to enable the key spring 10 to return such stop and its key, the keeper at once returning to effective position to snap beneath the lug of the desired key stop and lock the stop against restoration to idle position. There are as many racks 11 as there are rows of keys and stops, each rack being pivotally supported on swinging arms, the forward arms 16 only being shown, and a spring 17 (Fig. 3) tends to propel each rack forwardly. The racks are normally held at rest by a restraining and restoring bail 18 (Fig. 1) carried by arms 19 fast on a shaft 20, said bail normally lying in the paths of the swinging arms 16. Turning the drive shaft 21 on its initial stroke, in an adding operation withdraws the restoring bail through well-known mechanism, not shown, to permit the racks to be driven forwardly by their springs until arrested by the stops 8 set up by the keys. Means (not shown) is provided to restrain the racks in whose paths no stops have been projected. Numeral wheels 23 journaled on an axle 24 (Figs. 2 and 3) have pinions 22 fast thereto, which engage the respective racks 11 after the latter have been arrested by the stops 8. Upon the return stroke of the main drive shaft 21, the bail 18 restores the racks to normal position and the racks, during such restoration, turn the pinions to cause the wheels or counters 23 to register the proper amount. As the drive shaft completes its stroke, the pinions are disengaged from their driving means and well-known mechanism, not shown, is operated to rock a trip shaft 25, located adjacent the stop casing 9 and having tappets 26 to strike ears 27 on the keepers 12 to effect the release of the projected stops 8, which permits the restoration of the depressed keys by their springs 10.

It sometimes happens that an operator will not notice that keys have been erroneously depressed until after the drive shaft 21 has started its initial stroke. If then a correction is attempted, an incorrect addition may result, depending upon the distance through which the racks have been propelled and the position of the desired key-controlled stops relatively thereto. Also the type may be prevented from alining with the printing line or print an incorrect amount. To obviate these disadvantages, a novel means for locking the keys against operation is provided, such means becoming effective during the initial stroke of the main shaft prior to the projection of the racks and releasing the keys for operation on the return stroke of the shaft. Accordingly, each key has a catch 28 preferably formed by notching the key as at 29. 30, near its lower end, at that portion which passes through the cross-brace 2. Said cross-braces may comprise channel-bars, each of which supports a locking bar 31 having notches 32 therein normally alined with the catches 28 of the keys of each cross-row, (Fig. 8) to permit said keys to be depressed. Normally, the keys 4 are supported with their lower notches 30 in line with the notches 32 of the locking bars 31, (Fig. 10.) Depressing a key moves its catch 28 through a notch 32 of the locking

bar from a position above the bar 31 to a position on the other side thereof, to bring the notch 29 in line with said bar. The locking bars are held idle against the tension of springs 33, by a restraining and restoring bar or member 34 extending transversely of the series of locking bars 31, (Figs. 4 and 5,) and lying in the paths of studs or projections 35 on the respective locking bars. Said projections are preferably mounted on extensions 36 rigidly connected to the locking bars 31 and projecting through slots 37 in the cross bars 2. The desired keys having been depressed, the main shaft 21 is turned (by a handle or motor, not shown) in the direction of the arrow (Fig. 1) to effect the registration by means of well-known mechanism. The shaft 21 has a crank 38 fixed thereto and connected by a link 39 to rocking arm 40 which may be supported on a rod 41. Said arm normally lies in the path, preferably, of the restraining member 34 or of a stud or projection 42 thereon, to hold the member in effective position against the tension of a releasing spring 43. As the drive shaft 21 starts on its initial stroke, it rocks the restoring arm 40 to withdraw it from the stud or projection 42, whereupon the restraining member is freed to the action of its spring 43. Said spring thereupon shifts the restraining bar relatively to the locking bars 31 to bring recesses 44 in said restraining member in line with the studs or projections 35 on said locking bars, thus freeing said locking bars to the action of their springs 33 which slide the bars relatively to the cross braces 2. 2 and through notches 29 of the depressed keys and 30 of the undepressed keys, to bring imperforate portions of the locking bars in line with the catches 28 on the keys to latch said keys in either their normal or depressed positions against movement in either direction. The walls of the notches 29 and 30 extend at about right-angles to the latches 31 to catch on the latches and prevent restoration of the keys by pulling upwardly thereon, nor can undepressed keys be depressed for the same reason. During the return stroke of the main drive shaft, the arm 40 by pressure against the restraining member 34, returns the latter to normal position against the tension of its spring 43. One wall of each of the recesses 44 in the restraining bar is inclined and hence the return of said bar or member shoulders or cams the respective studs or projections 35 of the latches seated in said recesses in one direction to restore said latches 31 to their positions of rest against the tension of their locking springs 33, to bring the notches 32 of said latches or locking bars into register with the catches 28 on the keys. This registration frees the keys for restoration by their springs 10, the stops 8 being released by their keepers 12 at substantially the same time. The restraining and restoring member thus acts somewhat similarly to a series of cams to alternately free the locking bars to the action of their springs and return said bars to rest.

It will be noted that the locking mechanism is positioned some distance below the apertured guide plate 3. In fact, it preferably coacts with the lower ends of the keys and is, therefore, applicable to special keyboards, such, for instance, as that shown in Figs. 2 and 3. This special form of keyboard is provided with extra keys, as those numbered "10" and "11" in addition to the regular rows of keys. The upper ends of the stems 45 of said extra keys are horizontally curved to clear the stems of the unit keys "8" and "9", and hence any locking mechanism operating in conjunction with the upper ends of the keys, could not be readily applied to a special keyboard of this type.

Calculating machines of the Wales type are generally provided with a correcting key 46 to enable the operator to manually restore depressed keys, when such keys have been operated either by accident or mistake, for example. The correcting key is preferably pivoted to a tilting frame 47 rocking on a rod 48 in the main frame of the machine. Said tilting frame has a leg 49 to kick a crank 50 fast on the trip shaft 25 and thereby rock the trip shaft to effect the release of the stops 8, and the restoration of the depressed keys. Said correcting key also effects the restoration of the total key 51 prior to the rotation of the drive shaft, through a link 52 connecting the leg 49 with a crank 53 to which is attached an arm 54. A catch 55 (Fig. 15) pivoted to a segment 56 controlled by the main drive shaft, holds the total key down. The segment is provided with well-known means to hold the total key down during the stroke of the shaft. Depressing the correcting key swings the arm 54 against said latch to rock the latter and release the total key which is restored by its spring 57.

Obviously, an attempt might be made to correct erroneously depressed keys, by manipulating the correcting key after the drive shaft has started on its stroke, to avoid which, said correcting key is locked against operation when the shaft has started, and is held locked while the shaft is in other than its home position. Accordingly, the segment 56 is caused to enter and travel in the path of the arm 54 (Fig. 14) as the drive shaft is turned, said segment then constituting a stop to arrest the swinging arm 54 and hence prevent the operation of the correcting key until the main shaft has nearly returned to its position of rest.

Changes may be made in the form and ar-

rangement of the several parts described without departing from the spirit and scope of the invention.

What I claim as new, is:—

1. In a calculating machine, the combination with a drive shaft, of a flexible keyboard; and means to lock the keys against operation, comprising several notched locking bars, catches on the keys, with which catches the notches in the locking bars are normally alined; means tending to shift the locking bars to bring unnotched portions thereof in line with the catches to prevent the operation of the keys; and a restoring member normally holding said locking bars idle, and controlled by the shaft to free the locking bars.

2. In a calculating machine, the combination with a drive shaft, of a flexible keyboard; and means to lock the keys thereof against operation in either direction after the shaft has started on its initial stroke, comprising several notched locking bars, catches on the keys with which catches said notches are normally alined, springs tending to shift the locking bars to bring unnotched portions thereof above the catches on the operated keys and below the catches on the idle keys, to prevent operation thereof, a restoring member controlled by the drive shaft to normally hold the locking bars idle until the shaft is operated, and a spring to shift the restoring member when freed by the shaft, to permit the locking bars to operate.

3. In a calculating machine, the combination with a drive shaft, of a flexible keyboard; and means to lock the keys thereof against operation, comprising catches on the keys, several notched locking bars, the notches of which are normally alined with the catches, means tending to shift the locking bars to bring unnotched portions thereof into line with the catches, studs on said bars, and a restoring member controlled by the shaft and lying in the paths of said studs to hold the locking bars idle, said restoring member being recessed to accommodate the studs on the locking bars when the shaft starts on its initial stroke, to permit the locking bars to shift to effective position.

4. In a calculating machine, the combination with a drive shaft, of a flexible keyboard; and means to lock the keys thereof against operation, comprising catches on the keys, several notched locking bars, the notches of which are normally alined with the catches, means tending to shift the locking bars to bring unnotched portions thereof into line with the catches, a restoring member in the paths of the locking bars to hold them in ineffective position, means tending to shift the restoring member to free said locking bars for action, a projection on said restoring member, a swinging arm contacting said projection to hold the restoring member in operative position, and connections between the arm and shaft to rock the arm to release the restoring member.

5. In a calculating machine, the combination with a drive shaft, of a flexible keyboard; and means to lock the keys thereof against operation, comprising catches on the keys, several notched locking bars, the notches of which are normally alined with the catches, means tending to shift the locking bars to bring unnotched portions thereof into line with the catches; and a restoring member controlled by said shaft and having a series of cams to contact said locking bars and shift the latter to ineffective position or to free the locking bars to the action of their impelling means, as the shaft is turned in one direction or the other.

6. In a calculating machine, the combination with a drive shaft, of a flexible keyboard comprising a series of channeled cross-braces; keys, the lower ends of which pass through the cross-braces; catches on said lower ends; locking members supported by said cross-braces and co-acting with the lower ends of the keys, to lock the keys against movement in either direction; and means regulated by the shaft to control the locking members.

7. In a calculating machine, the combination with a drive shaft, and a flexible keyboard including several numeral keys; of a locking mechanism comprising catches on said keys, notched latches, the catches normally alined with said notches, means tending to shift the latches to bring unnotched portions thereof into line with the catches, and a combined restraining and restoring member controlled by the shaft to hold the latches inactive and to restore them to idle position.

8. In a calculating machine, the combination with a drive shaft; and a flexible keyboard including apertured cross-braces 2, 2, and several numeral keys 4 passing through said braces; of a locking mechanism comprising catches 28 on said keys, notched latch bars 31 supported on the braces, with their notches 32 normally alined with the apertures in the braces and the catches on the keys, springs 33 to shift the latches to bring imperforate portions thereof into line with the catches, projections 35 on said latches, a restraining and restoring bar 34 normally lying in the path of said projections to hold the latches idle, said restraining and restoring bar having recesses 35 normally out of alinement with said projections, a spring 43 to shift said restraining and restoring bar to aline the notches with the projections and thereby free the latches to the action of their springs, and an arm 40 controlled by the shaft 21 and engaging the restraining and restoring bar to hold the latter

in normal position when the shaft is at rest, and to restore the latches to idle position during the completion of a full stroke of the shaft.

9. In a calculating machine, the combination with a drive shaft, a keyboard, including several depressible keys; and a correcting key, of a locking mechanism controlled by the shaft to lock said keys against operation when the shaft starts on its initial stroke; and other means controlled by said shaft to lock the correcting key against operation when the shaft starts on its stroke.

10. In a calculating machine, the combination with a driving shaft; a keyboard, including several depressible keys, and a correcting key; of a locking mechanism for the keys controlled by the shaft and normally idle when the shaft is at rest; shiftable means connected to the correcting key; and a stop controlled directly by the shaft and adapted to enter the path of said shiftable means when the shaft is turned, to lock the correcting key against operation.

11. In a calculating machine, the combination with a driving shaft, registers, register-driving means released and restored by the operation of the shaft, a keyboard, including several spring-returned keys, stops set up by the keys in the paths of the register-driving means, keepers to releasably hold the stops in effective position, and a correcting key to trip the keepers; of a locking mechanism for the keys, controlled by the shaft and normally idle when the shaft is at rest; and means independent of the key-locking mechanism, to lock the correcting key against operation when the shaft is in other than its home position.

12. In a calculating machine, the combination with a driving shaft, registers, register-driving means released and restored by the operatiton of the shaft, a keyboard, including several spring-returned keys, stops set up by the keys in the paths of the register-driving means, keepers to releasably hold the stops in effective position, and a correcting key to trip the keepers, of an arm connected to the correcting key and normally free to swing when the shaft is at rest, and a stop controlled by the shaft and interposed in the path of the arm when the shaft begins its stroke, to lock the correcting key against operation.

13. In a calculating machine, the combination with a drive shaft 21, registers 23, register-driving mechanism 11 released and restored by the operation of the shaft, a keyboard, including several spring-returned keys 4; stops 8 set up by the depression of the keys, in the paths of the register-driving mechanism; a keeper 12 to releasably hold the stops in effective position; tripping means to release the keepers; a correcting key 46; and a rocking frame 47 connected thereto to contact said tripping means; of a link 52 connected to said frame; an arm 54 normally free to swing when the correcting key is operated and the shaft is at rest; and a stop carried by the shaft into the path of the arm to lock the correcting key against operation while the shaft is in other than its normal position of rest.

14. In a calculating machine, the combination with a drive shaft, a flexible multiple-bank keyboard; and a correcting key; of an arm rocked by the main drive shaft; a restraining and restoring member contacted by said arm, and having cams thereon; notched latches acted upon by said cams, and normally held idle by the restraining and restoring member; catches on the respective keys in line with the notches in the latches when the latter are idle; a swinging arm operated by the correcting key; and a stop rocked by the main drive shaft into the path of the swinging arm, to lock the correcting key against depression during the operation of said shaft.

15. In a keyset calculating machine, the combination with registering mechanism, and a main drive shaft, of a combined flexible and locking keyboard, the flexibility of which is retained during the first part of the initial stroke of the main drive shaft.

16. In a keyset calculating machine, the combination with a main drive shaft, and a flexible multiple-bank keyboard; of means to lock the keys of said keyboard against operation, including catches on the keys, notched latches, the notches of which are normally alined with the catches; and means controlled by the main drive shaft to shift said latches to effective position to lock the keys against release or depression.

17. In a calculating machine, the combination with a drive shaft, and a flexible multiple-bank keyboard; of locking members for the keys of said keyboard; and means controlled from the main drive shaft to render said locking members effective or ineffective, depending upon the position of the main drive shaft.

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In the presence of—
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