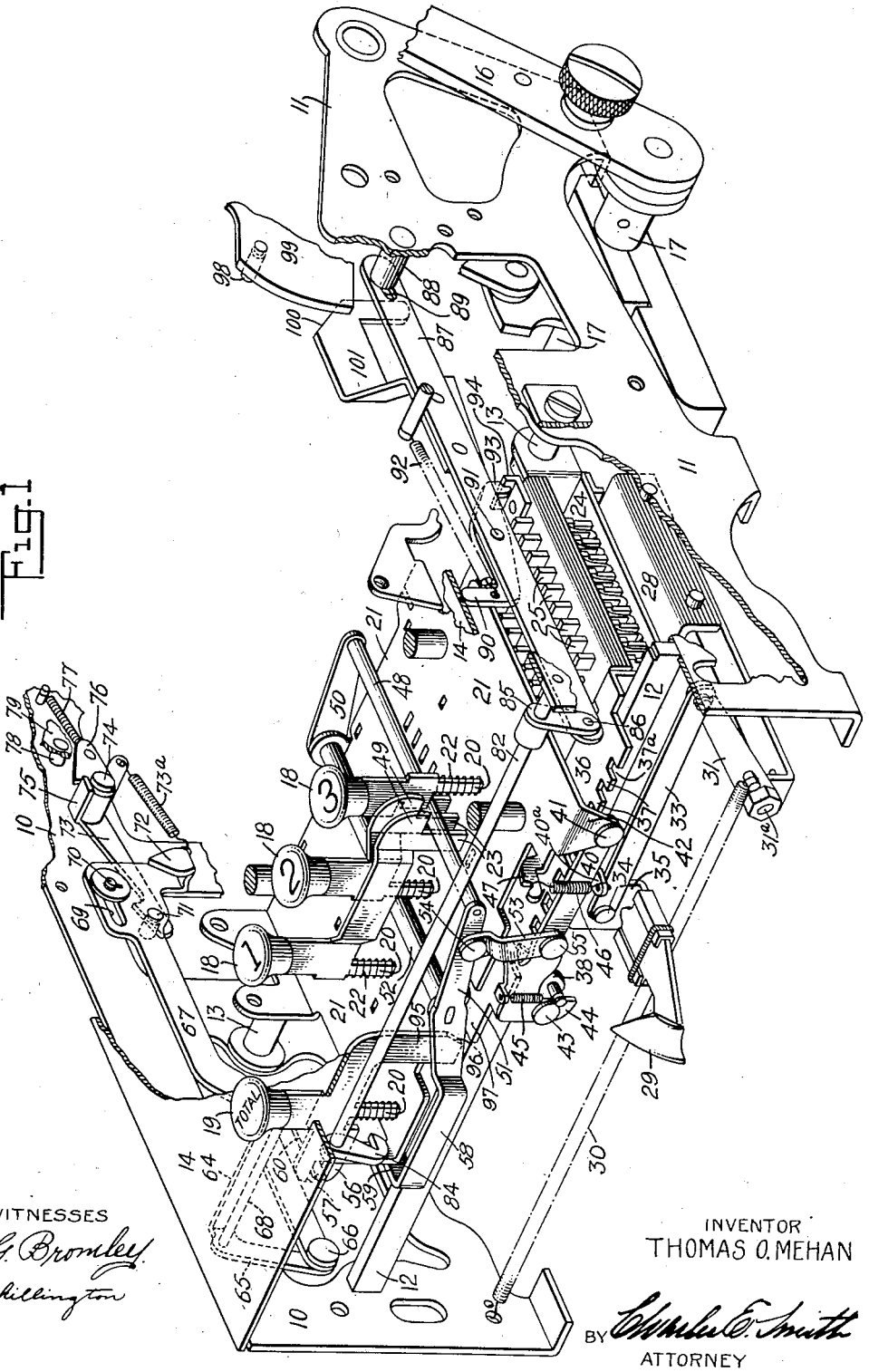
March 3, 1936. T. O. MEHAN 2,033,045

COMPUTING MACHINE

Filed Sept. 8, 1933 4 Sheets-Sheet 1

Fig. 1



WITNESSES

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COMPUTING MACHINE

Filed Sept. 8, 1933 4 Sheets-Sheet 2

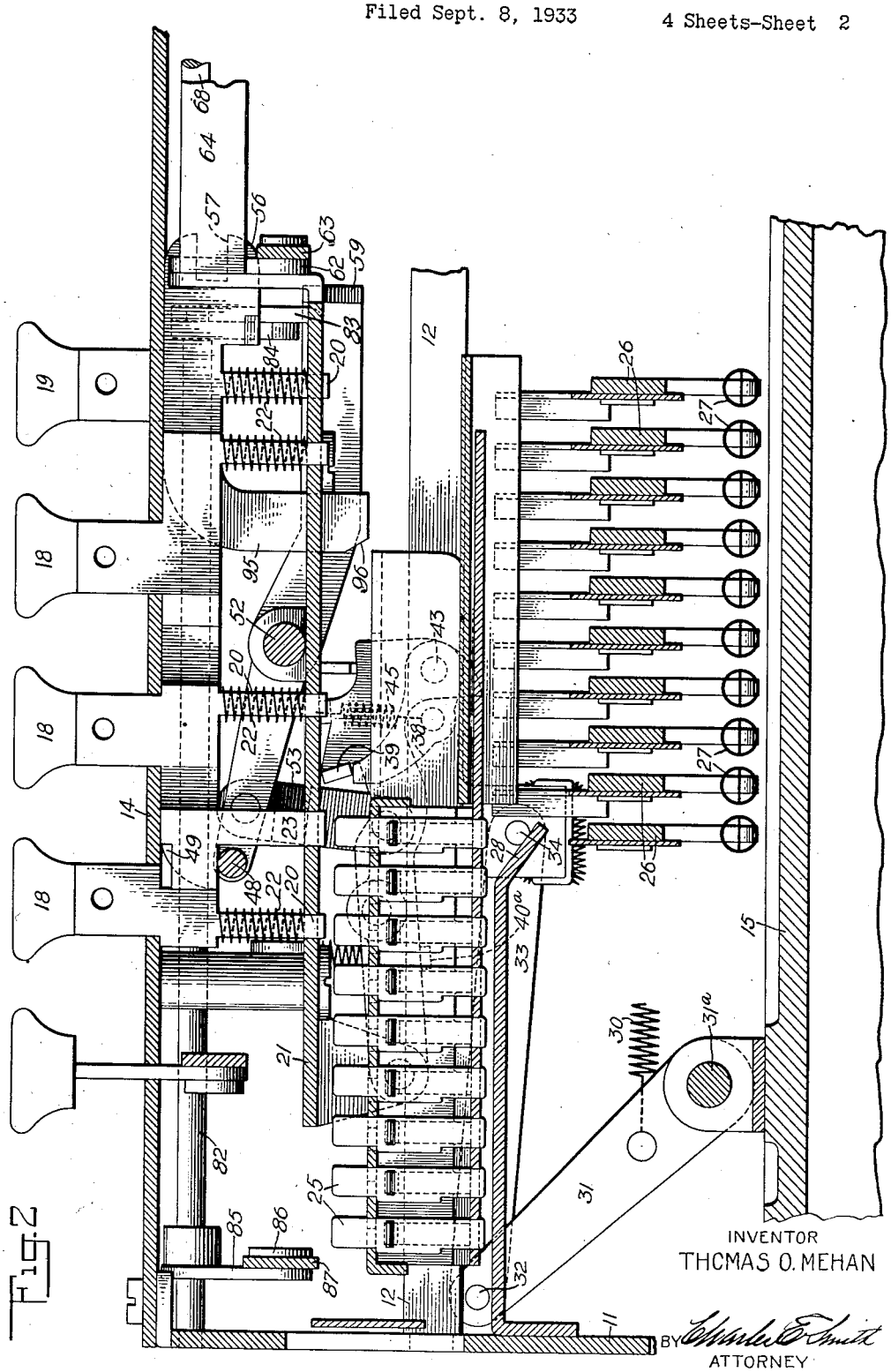

Fig. 2

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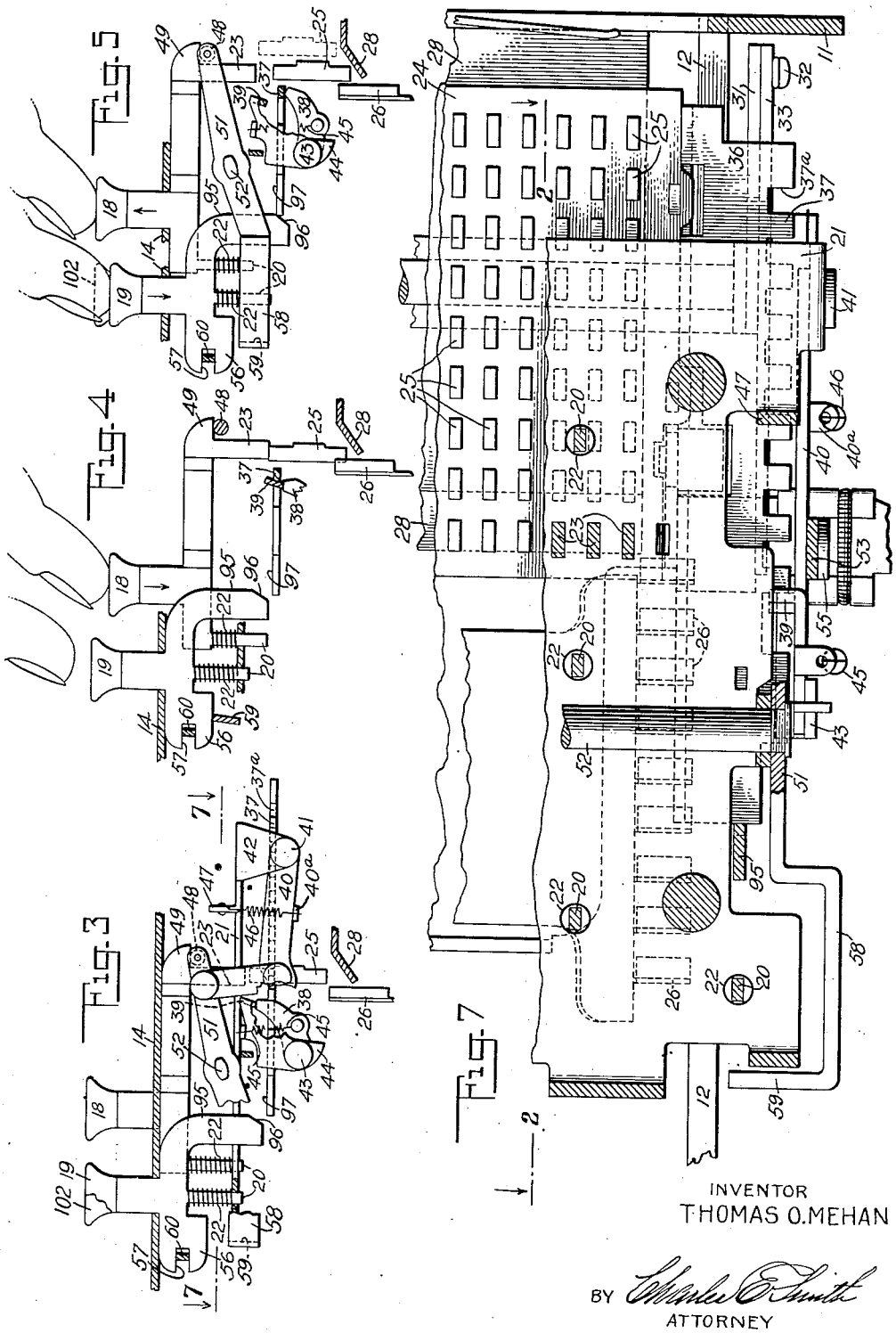
COMPUTING MACHINE

Filed Sept. 8, 1933 4 Sheets-Sheet 3



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COMPUTING MACHINE

Filed Sept. 8, 1933 4 Sheets-Sheet 4

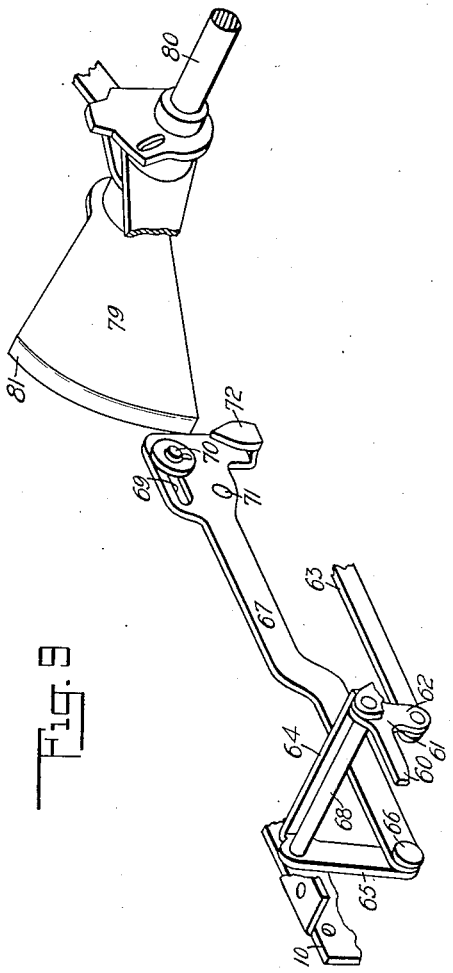

Fig. 9

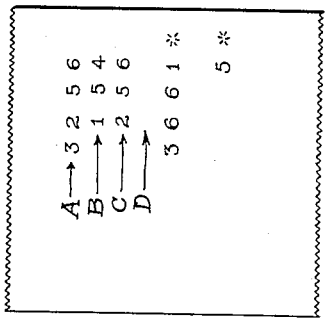

Fig. 8

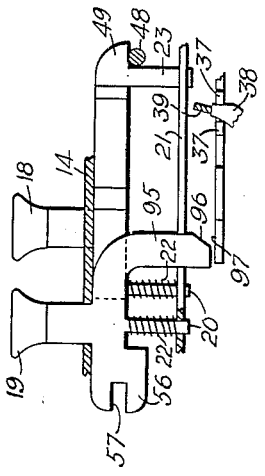

Fig. 6

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UNITED STATES PATENT OFFICE

2,033,045

COMPUTING MACHINE

Thomas O. Mehan, Norwood, Ohio, assignor to Remington Rand Inc., Buffalo, N. Y., a corporation of Delaware

Application September 8, 1933, Serial No. 688,629

12 Claims. (Cl. 235—60)

My invention relates to computing machines and more particularly to an interlock between the total key and pin carriage.

The main object of my invention, generally stated, is to provide mechanism to prevent an improper operation of the machine by the operator "riding" the total key which, ordinarily, under certain conditions results in giving a wrong total and in leaving an amount in the dials after a total has been taken, as will be hereinafter more fully explained.

Regarded from another point of view the main object of the invention is to render it impossible by an improper manipulation of the total key in connection with any one of the digit keys, after a blank stroke has been taken, to set up an additional amount in the machine corresponding to said actuated digit key.

A further and more specific object of my invention is to provide mechanism whereby under certain conditions of use the total key returns the stop carriage to its initial position and under certain other conditions of use, the pin carriage prevents a depression of the total key.

A still further object of my invention is to provide an interlock of the character referred to which is simple in construction, efficient in use, and economical to manufacture.

To the above and other ends which will hereinafter appear, my invention consists in the features of construction, arrangements of parts and combinations of devices set forth in the following description and particularly pointed out in the appended claims.

In the accompanying drawings, wherein like reference chraracters represent corresponding parts in the various views—

Fig. 1 is a fragmentary, isometric view of the front portion of a computing machine with the outer casing and bed plate removed, the view showing my novel interlock between the total key and pin carriage together with various parts associated therewith.

Fig. 2 is an enlarged, fragmentary, transverse, sectional view of the same taken on a plane corresponding to the line 2—2 of Fig. 7 and looking in the direction of the arrows at said line, and with the left-hand side plate of the frame and other parts omitted.

Fig. 3 is a fragmentary, front elevation with parts in section of the total key, escapement mechanism, one of the numeral keys and some of the associated parts; the keys being shown in normal position.

Fig. 4 is a view similar to Fig. 3, but showing the numeral key depressed, and the relative positions of the parts moved thereby.

Fig. 5 is a front elevation similar to Fig. 4, but showing the positions of the parts after an actuation of the numeral key and a subsequent depression of the total key with the pin carriage shifted back to initial position and held therein by the depressed total key.

Fig. 6 is a front elevation similar to Fig. 5, but showing the pin carriage moved one step to the left from its initial position and the total key locked thereby against depression.

Fig. 7 is an enlarged, fragmentary, plan view partly in section, the section being taken on the line 7—7 of Fig. 3 and looking in the direction of the arrows at said line.

Fig. 8 illustrates a printed record showing an example of an improper total and showing an indication that an amount is left in the dials such as would occur in the misoperation of the machine in the event that it was not equipped with the devices of the present invention.

Fig. 9 is a detail, fragmentary, perspective view of a portion of the machine.

In the present instance I have shown my invention embodied in a Remington listing-adding-calculating machine, which is a ten key computing machine of the character disclosed in my United States Patents Nos. 1,835,170, 1,876,719 and 1,899,444. While the present invention may be readily embodied in said machine with but slight changes in the existing structural features thereof, it should be understood that the invention may be embodied in other forms of computing machines, wherever found available.

In the accompanying drawings I have shown only so much of said machine as may be necessary to arrive at an understanding of my present invention in its embodiment therein.

From a consideration of Fig. 1 it will be seen that the frame of the machine by which the various working parts are supported comprises side plates 10 and 11 united by cross bars 12 and 13, by a top plate 14 and by a base or bed plate 15, the latter being shown in Fig. 2.

The computing and printing operations determined by the set-up from the digit keys, are controlled in the present instance by the usual handle-carrying crank arm 16 secured to the main driving shaft 17, though obviously said shaft may be motor driven.

The usual ten digit keys 18 and total key 19 are arranged above the top plate; the stem of each key passing through a guide slot in said plate. A reduced depending portion 20 of each

key stem passes through a guide slot in a second fixed guide plate 21 and is surrounded by a coiled expansion return spring 22. Each return spring bears at its lower end against the plate 21 and at its upper end against the shoulder formed at the intersection of the body of the associated key stem and the reduced portion thereof. Each digit key stem also has an off-set depending arm 23 that extends through a guide opening in the plate 21, all of the arms 23 being arranged in a single row fore and aft of the machine.

The pin carriage, which is designated as a whole by the reference numeral 24, is supported and guided on the cross bars 12 and 13 for movement transversely of the machine beneath the guide plate 21. This carriage carries nine rows of pins 25 with nine pins arranged in each row. Each of these pins is mounted in the carriage for a limited vertical movement therein from an upper ineffective position shown in Fig. 1, to a lower effective position, shown in full lines in Fig. 5. The parts are so constructed that each pin remains in either position to which it may be shifted until displaced therefrom, as will hereinafter appear. When the carriage is in its normal or initial right-hand position, the left-hand fore and aft row of pins 25 is beneath the depending arms 23 of the digit keys.

As the carriage moves step-by-step from its initial right-hand position, the fore and aft rows of pins 25 are brought successively into register with the row of depending arms 23, each pin 25 of a row being directly beneath the corresponding arm 23, depending on the value of the key which carries the arm.

When the crank arm 16 is actuated, each depressed pin will arrest the corresponding control rack 26 (spring impelled by its associated spring 27) in its proper position to determine the amount to be registered and recorded. At the back stroke of the crank arm 16 the carriage is automatically returned to the right beyond its initial position and eventually comes to rest in such position. During such return movement of the carriage the lowered effective stops or pins 25 are brought successively into contact with a fixed cam plate 28, thus causing the pins to be elevated by a camming action and restored to ineffective position on the pin carriage.

This return movement of the carriage may also be effected at any time with the aid of the usual correction key 29, as pointed out in my above mentioned Patent No. 1,876,719.

The step-by-step feed movement of the pin carriage is controlled in the same manner as disclosed in my above mentioned Patent No. 1,899,444 and will now be described.

Power is exerted to move the carriage from right to left by a spring 30 (Figs. 1 and 2) anchored at one end and connected at its opposite end to an arm 31. Said arm is pivoted at its lower end, at 31a, to a bracket on the bed plate 15, the upper end of the arm being pivoted at 32 to one end of a link 33. The opposite end of this link is pivoted at 34 to an arm 35 which carries a correction key 29 and is connected to the pin carriage to move therewith.

A feed rack 36 (Fig. 1) is fixed to the pin carriage to travel therewith. The forwardly projecting teeth 37 on this rack coact with feed dogs 38 and 39 respectively carried by a dog rocker or arm 40. Said dog rocker is pivoted at 41 on a depending ear 42 on the fixed guide plate 21, as best shown in Figs. 1 and 3. The normally engaged feed dog 38 is in the nature of a loose or stepping dog pivoted at 43 to a depending arm 44 on the dog rocker. A spring 45 is connected with the loose dog 38 and tends to hold it against the under edge of the fixed dog 39 that is formed as a laterally projecting lug on the dog rocker. The dog 38 normally extends into an interdental space 37a between the teeth of the feed rack and thus holds the pin carriage against movement to the left by the power applied thereto by the spring 30. When the dog rocker 40 is lowered by a downward movement around its pivot 41, the dog 38 is withdrawn from the interdental space and when freed from the engaged tooth of the feed rack will permit a slight forward advance or "drop" of the carriage until the same tooth of the rack engages the fixed dog 39, which by this time has moved into the path of the rack tooth from which the loose dog has just been released. This slight "drop" of the carriage, which occurs on the down movement of the dog rocker and of a digit key, is less than or a fraction of a full step of the carriage, and is sufficient to bring the upper end of the dog 38 beneath the adjacent tooth 37 of the feed rack. When the depressed digit key is released, the dog rocker 40 is moved upward by its returning spring. Said spring is anchored at one end on a bracket arm 47 of the guide plate 21 and has its lower end connected to an ear 40a on the dog rocker, as shown in Fig. 1. The effective force of the spring 46 is greater than that of the spring 45 and causes the upper end of the dog 38 to slide to the right along the under side of the engaged tooth 37 and enter the next interdental space 37a to the right of such tooth as the holding dog 39 is withdrawn from the engaged rack tooth. This enables the carriage to advance the remainder of its distance to complete the step of the carriage, thereby bringing the first fore and aft or denominational row of pins 25 more fully beneath the row of key actuated arms or plungers 23 and into more complete register with the first of the racks 26. In this movement of the carriage the pressure of the carriage spring 30 overcomes the slight pressure of the spring 45 on the loose dog 38, and the movement of the latter continues until it is arrested by engaging the fixed dog 39, thus holding the carriage against further forward movement.

It will be understood, however, that the carriage is free to be moved to the right either by the correction key 29 or by the automatic action of the arm 31 on the back stroke of the handle actuated crank arm 16. At this time the loose dog 38 will be cammed against the force of its spring 45 out of the interdental space in the rack in which said dog is received and will enter the first registering interdental space when the carriage is arrested and as the carriage starts to move to the left. This is true whether the carriage is returned the distance of one or more teeth of the feed rack.

In order to actuate the dog rocker at each actuation of a digit key, there is provided a universal bar 48 which underlies off-set aligned projections 49 on all of the key stems of the digit keys, to be actuated thereby. Said universal bar is connected at its ends to crank arms 50 and 51 fixed on a rock shaft 52. A link 53 is pivoted at its upper end to the crank arm 51, as indicated at 54, whereas the lower end of said link is pivoted at 55 to the dog rocker 40. It will be understood, therefore, that a depression of any digit key will actuate the universal bar and the dog rocker controlled thereby and thus advance the

carriage one step at each complete actuation of any digit key.

The total-taking mechanism comprises the total-taking key 19 mounted for vertical movement in guide slots in the plates 14 and 21 and said key is returned to normal position by the associated spring 22, as hereinbefore pointed out. Projecting to the left from the stem of the total key is an arm 56 slotted horizontally at 57. The crank arm 51 of the universal bar is extended beyond its rock shaft to provide an arm 58 formed at the free end thereof with a rearwardly extending lug or projection 59 that extends beneath the arm 56 of the total key. It will be understood, therefore, that when any digit key is held fully depressed, as shown in Fig. 4, a corresponding depression of the universal bar 48 will elevate the projection 59 and prevent a depression of the total key 19. Moreover, when the total key is held depressed, this will elevate the universal bar 48 and prevent a depression of any of the digit keys. Notwithstanding this interlock between the total key and the digit keys, there is at times presented a condition when in the absence of the features of the present invention an erroneous total may be entered in the machine and a number left in the totalizer when it is supposed to be cleared, as will hereinafter more clearly appear.

The open end slot 57 in the arm 56 of the total key receives an arm 60 of a bell crank lever 61 of a total lock mechanism (Fig. 9). A second arm 62 of this bell crank lever is connected to one end of a link 63 which operates to shift the usual accumulator engaging and disengaging mechanism (not shown) so that the latter will operate to take a total and clear the accumulator as fully disclosed in my above mentioned patents. Formed integral with the bell crank 60, 62 through a cross bar 64 is a third arm 65 that has its lower end pivoted, at 66, to a rearwardly extending link 67. A pivot rod 68 supports the member 60, 62, 64, 65. The rear end portion of the link 67 is slotted at 69 to receive a headed stud 70 carried by the side plate 10 and by which the rear end of the link is supported and guided.

The link 67 has an outwardly projecting pin 71 near its rear end and also has an inwardly and upwardly projecting lug 72 that terminates in a pointed end, as shown in Figs. 1 and 9. A hook-like latch 73 is pivoted on a headed pin 74 secured to the side plate 10 and is normally held in its elevated position by a spring 73a. This latch has a bent over lug 75 which is adapted to be engaged by an engaging nose formed on a separate one way pawl 76 also pivoted on the pin 74. This pawl is normally held in the position shown in Fig. 1 by a spring 77 and is adapted to be engaged by a pin 78 on a keeper plate 79. In the downward movement of the pin 78 from the Fig. 1 position, the pawl 76 will be moved down around its pivot by said pin independently of the latch 73, the pin passing the pawl at the last part of its movement. On the next upward movement of the pin 78, however, it will turn the pawl in an anti-clockwise direction as the parts appear in Fig. 1. The pawl at this time will engage the lug 75 and actuate the latch to release it from the pin 71 if the latter is engaged thereby, thus freeing the link 67.

The keeper plate 79 is secured to a shaft 80 and has an outwardly projecting flange 81 which when the link 67 is in its rearward position engages in front of the lug 72 and prevents said link from moving forward until just prior to the completion of the operating cycle as fully explained in my above mentioned patents.

Blank stroke lock

The blank stroke lock has been described in detail in the before mentioned patents, but I deem it necessary to describe it here in order to bring out more forcibly the need of my present supplemental lock or interlock between the total key and pin carriage during the accidental "riding" on or improper use of the total key.

The blank stroke mechanism comprises the shaft 82 rotatively mounted in bearings in the side plate 11 and in an upwardly struck bracket arm 83 of the lower guide plate 21. This shaft has a locking hook 84 secured thereto near its left-hand end, as shown in Fig. 1. The bill of this hook is adapted to lie beneath the projection 56 of the total key 19 when the stop carriage is displaced from its normal or initial position at the right. This results in locking the total key until the blank stroke of the handle or crank arm 16 is taken. A depending arm 85 is secured to the shaft 82 near the right-hand end thereof and is pivotally connected, at 86, to the forward end of a link 87. The rear end of said link is supported and guided by a pin 88 which projects from the side plate 11 and extends through a slot 89 in the link. A latch 90 is pivoted at 91 to the link 87 and has a spring 92 connected thereto so as to normally rock the latch clockwise on its pivot, as the parts appear in Fig. 1, the movement of the latch under the pull of the spring being limited by the top plate 14. The latch 90 has a depending toe portion 93 adapted to engage the front face of a vertically disposed lug 94 which is secured to the carriage 24. After every blank stroke of the handle and total taking operation the toe 93 of the latch 90 is held in engagement with the front of the lug 94 by the spring 92 and this in turn holds the engaging end or bill of the hook 84 clear of the projection 56 of the total key 19. It will be seen, therefore, that when the carriage is in its normal position with the lug 94 thereon engaged by the latch 90, this will resist the rearward movement of the link 87 under the action of the spring 92 thereon and will hold the locking hook 84 out of locking position. However, when the carriage advances one step from normal position, the lug 94 will be released from the latch 90 and the latch and lug will no longer restrain the link 87 against rearward movement under the action of the spring 92 and the locking hook 84 will move to locking position.

The construction thus far described constitutes part of the usual Remington computing machine hereinbefore referred to and is disclosed in my said patents.

Interlock between total key and pin carriage

Referring now to the novel interlock of the present invention between the total key and the pin carriage, attention is directed to Figs. 3 to 6 where it will be seen that the stem of the total key 19 is provided with an off-set downwardly projecting arm or finger 95, the lower extremity of which is tapered slightly at 96 to form a cam on the right-hand edge thereof. This is to insure a shifting of the pin carriage to the right, as will be hereinafter more fully described. The escapement rack 36 is provided with an extended shelf-like portion 97 which is out of the path of the finger 95 of the total key 19 when the stop

carriage is in normal position shown in Figs. 1 and 3.

Under normal operation, the machine is actuated in the usual manner by depressing the selected digit keys 18 which operate to set up the pins or stops 25 in the carriage 24, as shown in Fig. 4. A full operation of any one of the digit keys 18, including the return thereof to normal position, causes the escapement mechanism to be actuated to advance the carriage one full space to the left from its normal position under the influence of the spring 30, as previously pointed out. As soon as this step of the carriage is effected the latch 90 is no longer restrained by the lug 94 and the spring 92 moves the link 87 rearward until it is arrested by the engagement of the pin 88 with the forward end of the slot 89. This rearward movement of the link 87 rocks the shaft 82 counter-clockwise (as viewed from the right-hand side in Fig. 1) causing the bill of the hook 84 to pass beneath the projection 56 on the stem of the total key 19. The total key will thus remain locked against depression by the hook 84 during two complete operations of the crank arm or handle. During the first operation the hook is temporarily released since the link 87 is moved forward by a pin 98 on a cam 99 engaging a cam edge 100 of an arm 101 that is attached to and projects laterally and rearwardly from the link 87. When, however, this takes place, the lug 72 will lie in front of the flange 81 on keeper plate 79 and thus prevent a depression of the total key.

Since the carriage is automatically returned to its normal right-hand position, or beyond it, just prior to the completion of the return stroke of the handle or crank arm 16, the toe 93 of the latch 90 will have passed to the rear of the position normally taken by the lug 94 before the carriage is in normal position. Therefore, upon the completion of the first operation of the handle the link 87 will be in its rearward position and the total key locked. It follows that an additional operation or "blank stroke" of the handle is necessary to condition the machine for total-taking.

During this blank stroke the carriage 24 will, of course, remain in normal right-hand position and when the link 87 is moved forward by the pin 98 the toe 93 will engage the front of the lug 94 thereby holding the link 87 in its forward position. With the link in this position the bill of the hook 84 is removed from beneath the projection 56 on the stem of the total key and the total may therefore be taken on the third operation of the handle.

It is at this point during the operation of the machine that carelessness on the part of the operator would, in the absence of the features of the present invention, permit a wrong total to be taken, as will now be explained. With the machine in the condition for total-taking it will be observed that the total key is not locked by hook 84 and cannot be locked by the lug 72 until the operating handle is started on its forward stroke. Therefore, with the machine thus conditioned for total-taking, let us assume that the operator accidentally depresses a digit key and as it is allowed to return to elevated position, depresses a total key (as illustrated in Fig. 5) then the following conditions would result in the absence of the features of the present invention. The hook 84 would not have had chance to move beneath the projection 56 of the total key and the depression of the digit key would result in setting up an additional stop 25 and immediately taking a total which would include the amount of the accidentally depressed digit key. As an example of this attention is directed to Fig. 8 which shows three amounts A, B and C set up in the machine, the blank stroke being indicated by the space D. In this instance the "1" key, we will assume, was depressed and as it was allowed to restore, the total key was depressed permitting a total-taking operation to immediately follow. As indicated in Fig. 8 the total is wrong and the numeral "5" is left set up in the machine rendering a subsequent total inaccurate as well.

With my novel interlock between the total key and the pin carriage it is impossible by such improper manipulation of the total key in connection with any one of the digit keys (after a blank stroke has been taken) to set up an additional amount in the machine and immediately follow with a total-taking operation.

In the event that the blank stroke of a handle has been taken and the operator should then depress a digit key while dwelling or "riding" on the depressed total key the following operation of the parts will result. The stop pin 25 corresponding to the depressed digit key will be moved down to effective position, as indicated in Fig. 4, and a slight forward advance or "drop" of the carriage from the Fig. 3 to the Fig. 4 position will be brought about. This will advance the left-hand edge of the table-like portion 97 of the carriage into the path of the cam edge 96 on the totalizer key, and as the latter moves from the Fig. 4 to the Fig. 5 position will return the carriage to the right and hold it in its normal position. The result of this is to bring the lowered pin 25 to the right of the first rack 26 so as to be ineffective thereon, thus preventing the amount determined by said pin from being set up. The depression of the total key at this time results in it being automatically locked by the latch 73 which in turn locks the digit keys. It is therefore necessary to actuate the handle or crank 16 which results in overthrowing the carriage to the right and wiping out or restoring the depressed pin 25 by the cam 28.

If, however, a full depression of the total key takes place in advance of the depression of any digit key, then the arm 95 will be brought into the path of movement of the carriage and the latter cannot be advanced from its normal position and, of course, all of the digit keys will remain locked at this time.

If, on the other hand, a digit key is depressed first in the circumstances indicated above and is allowed to return to normal position, thus affording an advance of the carriage for a full step, then this will bring the table-like portion 97 of the carriage beneath and in the path of the arm 95 on the total key and will prevent a depression of said key.

From the foregoing description it will be readily apparent that after a blank stroke is taken it is impossible to set up an additional amount in the machine and immediately follow with a total-taking operation by depressing a digit key and a "riding" of the total key, due to the arm 95 and the part 97 on the carriage. In other words, if a digit key has been depressed allowing the carriage to move slightly to the left and the operator then depresses the total key before allowing the digit key to restore, the cam surface on the total key then restores the carriage to normal position thus preventing any stops from coming in line with the adding rack 26. If, however, the operator allows the digit key to restore before trying to depress the total key, the

shelf-like portion 97 on the carriage moves under the total key preventing a depression of the latter. The construction is therefore rendered "fool proof" against misoperation by the operator in the circumstances and in the manner pointed out above.

While I have hereinbefore referred throughout to the "total key" 19 and its action, it will be understood that such term also applies to the usual sub-total key 102, shown in Figs. 3 and 5 inasmuch as everything that has been said with reference to the "total key" 19 also applies to the control of and by the sub-total key, and in said Remington machine an actuation of the sub-total key 102 results in actuating the total key 19.

From the foregoing description it will be understood that I am enabled to attain the advantages pointed out by very simple additions to the above mentioned Remington computing machine without modifying the existing structural features thereof. However, as hereinbefore pointed out the invention is not restricted to embodiment in such machines and various changes may be made in the construction without departing from my invention as it is defined in the accompanying claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a computing machine, the combination of a pin carriage, a total key, and interlocking means between said total key and carriage so constructed and arranged that a full step advance of the carriage from its initial position will interpose a fixed part on the carriage directly in the path of a part fixed directly to the total key and prevent an actuation of said total key.

2. In a computing machine, the combination of a pin carriage, a total key, and interlocking means between said total key and carriage so constructed and arranged that an actuation of said total key after the carriage has advanced a part only of a complete step from its initial position will result in shifting said carriage back to and in holding it in its initial position.

3. In a computing machne, the combination of a pin carriage, a total key, and interlocking means between said total key and carriage so constructed and arranged that a full step advance of the carriage from its initial position will interpose said carriage in the path of and prevent an actuation of said total key, said interlocking means comprising a locking member fixed on the carriage and cooperating directly with a locking member fixed directly to said total key.

4. In a computing machine, the combination of a pin carriage, a total key, and interlocking means between said total key and carriage so constructed and arranged that an actuation of said total key after the carriage has advanced a part only of a complete step from its initial position will result in shifting said carriage back to and in holding it in its initial position, said interlocking means having one element thereof carried directly by said carriage and the other element thereof carried directly by said total key.

5. In a computing machine, the combination of a pin carriage, digit keys for setting pins on said pin carriage, a total key, and interlocking means between said total key and carriage so constructed and arranged that when the machine is otherwise conditioned to permit an actuation of the total key a full step advance of the carriage from its initial position will result in bringing the carriage into the path of the total key and in locking said key against actuation.

6. In a computing machine, the combination of a pin carriage, digit keys for setting pins on said pin carriage, control racks with which the pins on said carriage coact, a total key, and interlocking means between said total key and carriage so constructed and arranged that an actuation of said total key after a pin has been set and the carriage has been advanced a part only of a complete step from its initial position by the depression of a digit key will result in shifting said carriage back to and holding it in its initial position, thereby shifting and maintaining the actuated pin out of cooperative relation with any of said control racks during a total taking operation.

7. In a computing machine, the combination of a pin carriage, a total key, and a locking member carried by said total key, the pin carriage and locking member being so constructed and arranged that an advance of the carriage one complete step from its initial position will bring it into the path of said locking member and prevent an actuation of the total key.

8. In a computing machine, the combination of a pin carriage, digit keys, a total key, and a locking member carried by said total key and provided with a cam, said carriage cooperating with the locking member so that an advance of the carriage one complete step from its initial position will bring it into the path of said locking member and prevent an actuation of the total key whereas the advance of the carriage for a part only of a complete step from its initial position by a mere depression of a digit key will bring the carriage into cooperative relation with said cam so that a depression of the total key at this time will result in camming the carriage back to initial position and in holding it in such position as long as the total key is maintained depressed.

9. In a computing machine, a pin carriage, a manually operated total key, and locking mechanism controlling said carriage and key and being constructed and arranged so that under certain operating conditions of the machine the said locking mechanism serves to lock the total key against depression dependent on the position of said carriage, and including means which under certain other conditions serve to restore the carriage to and lock it in its normal position by depression of the total key.

10. In a computing machine, the combination of a pin carriage movable from normal position during a computing operation, a total key, a stem for said key, an outwardly and downwardly projecting finger formed integral with said key stem, and an extended horizontal shelf-like portion supported by and movable with said carriage, said parts being so constructed and arranged that when said carriage is in its normal position the shelf portion supported thereby is clear of said finger, and upon depression of said total key after an advance of the carriage for a part only of a complete step the said finger coacts with said shelf to restore the carriage to its initial position and block and advance movement thereof thus locking the carriage in normal position, and when said key is in its normal position and the carriage is displaced a full step from its normal position said shelf will be carried beneath said finger thus locking said key against depression, thereby preventing a misoperation of the machine.

11. In a computing machine in which a blank stroke of the handle is required before total-taking in order to provide a proper operation, the

combination of a pin carriage, a total key, and interlocking means between said total key and pin carriage including means for automatically returning the carriage to and holding it in the home position when the total key is depressed and in the event that a partial advance step of the carriage has been effected, thus preventing an effective setting up of a pin in the pin carriage in the event the total key has been fully depressed.

12. In a computing machine in which a blank stroke of the handle is required before total taking in order to provide a proper operation, the combination of a pin carriage, digit keys, a total key, and interlocking means between said total key and pin carriage which prevents an actuation of the total key in the event that the carriage has advanced a complete step from initial position and which restores the carriage to its initial position in the event that the carriage has advanced a part only of a step from its initial position, whereby an actuation of a digit key before total-taking and after a blank stroke does not result in a misoperation of the machine.

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