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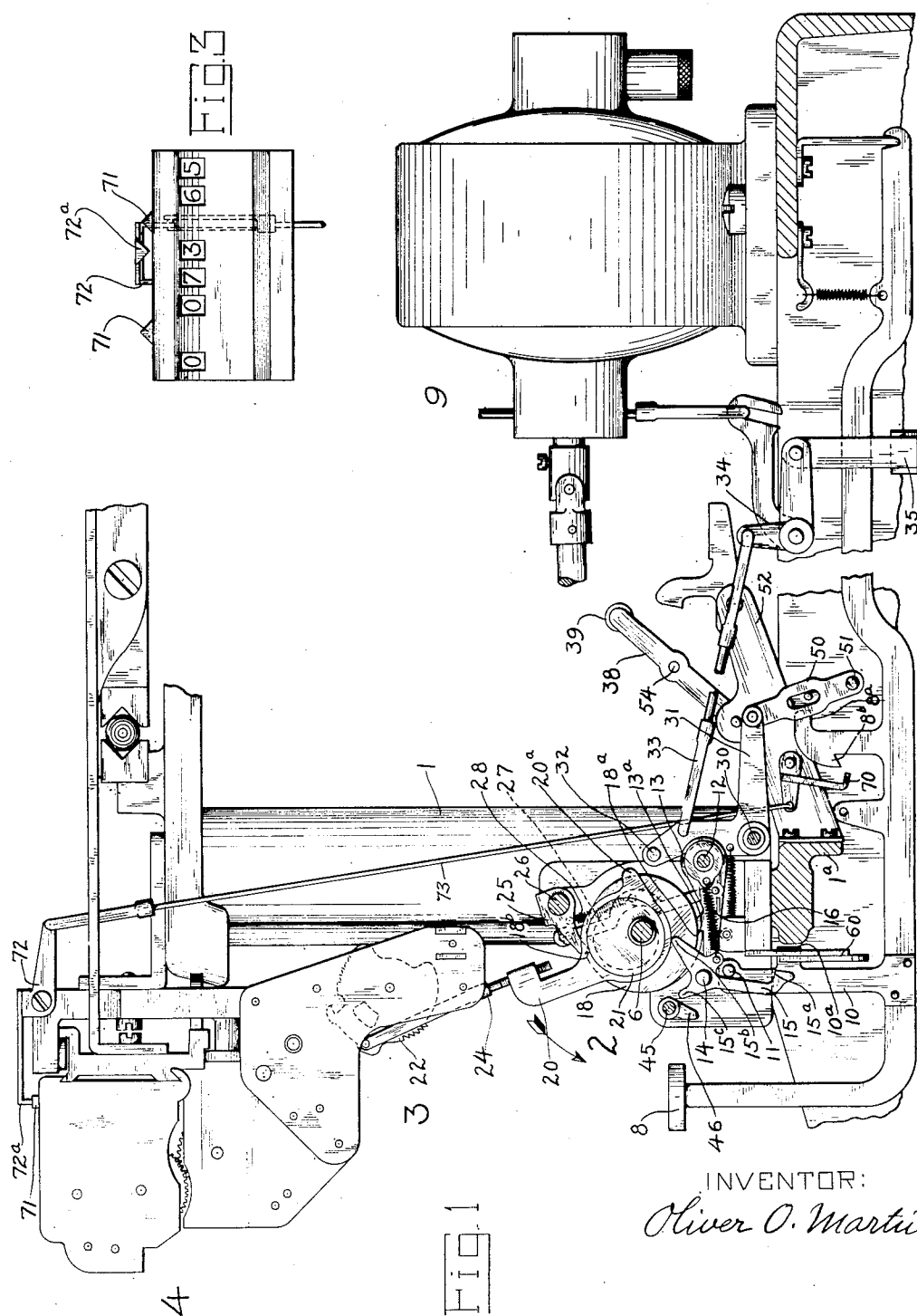
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O. O. MARTIN

CALCULATING MACHINE

Filed May 13, 1921

6 Sheets-Sheet 1



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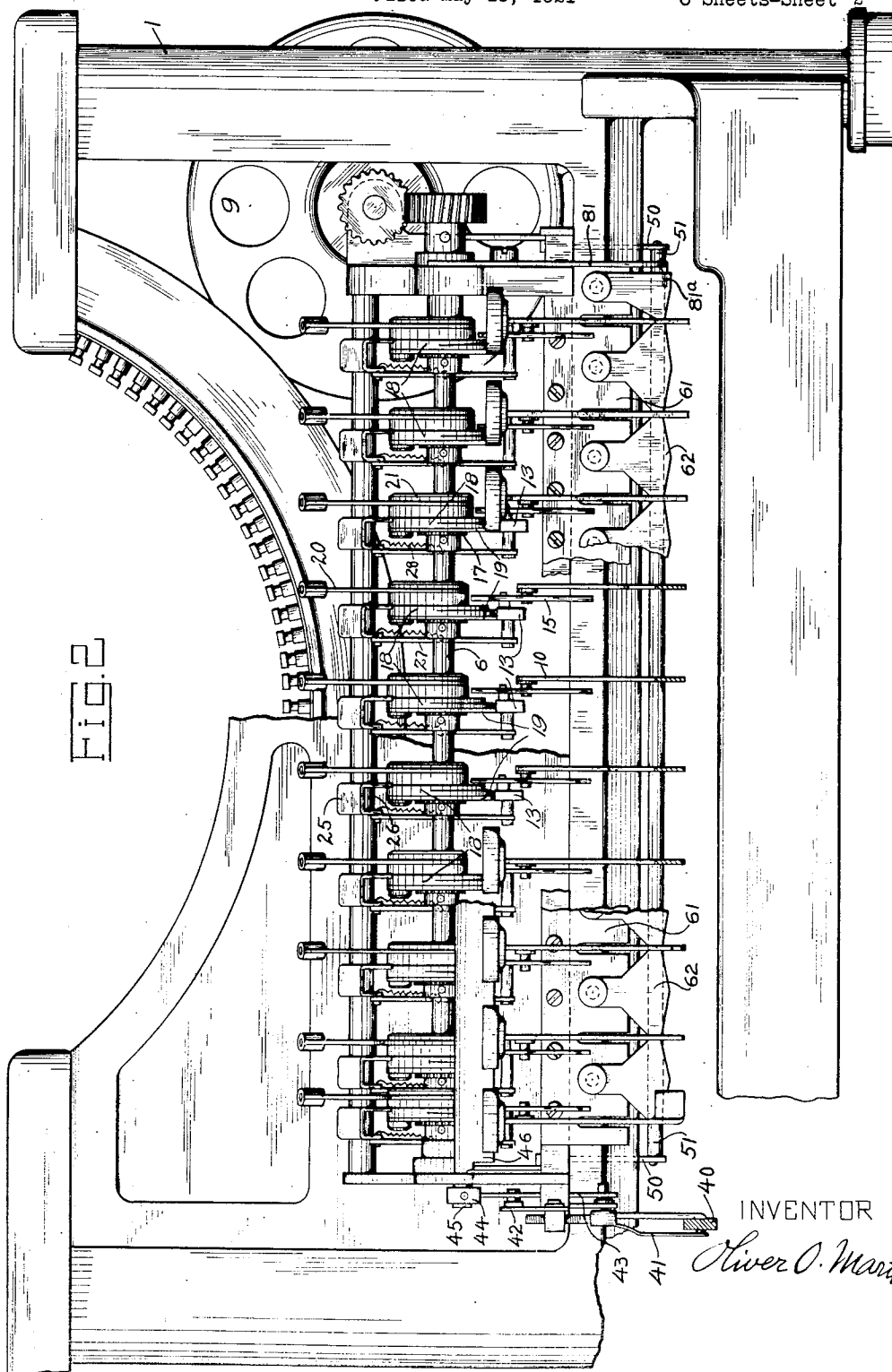
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O. O. MARTIN

CALCULATING MACHINE

Filed May 13, 1921

6 Sheets-Sheet 2



Feb. 3, 1925.

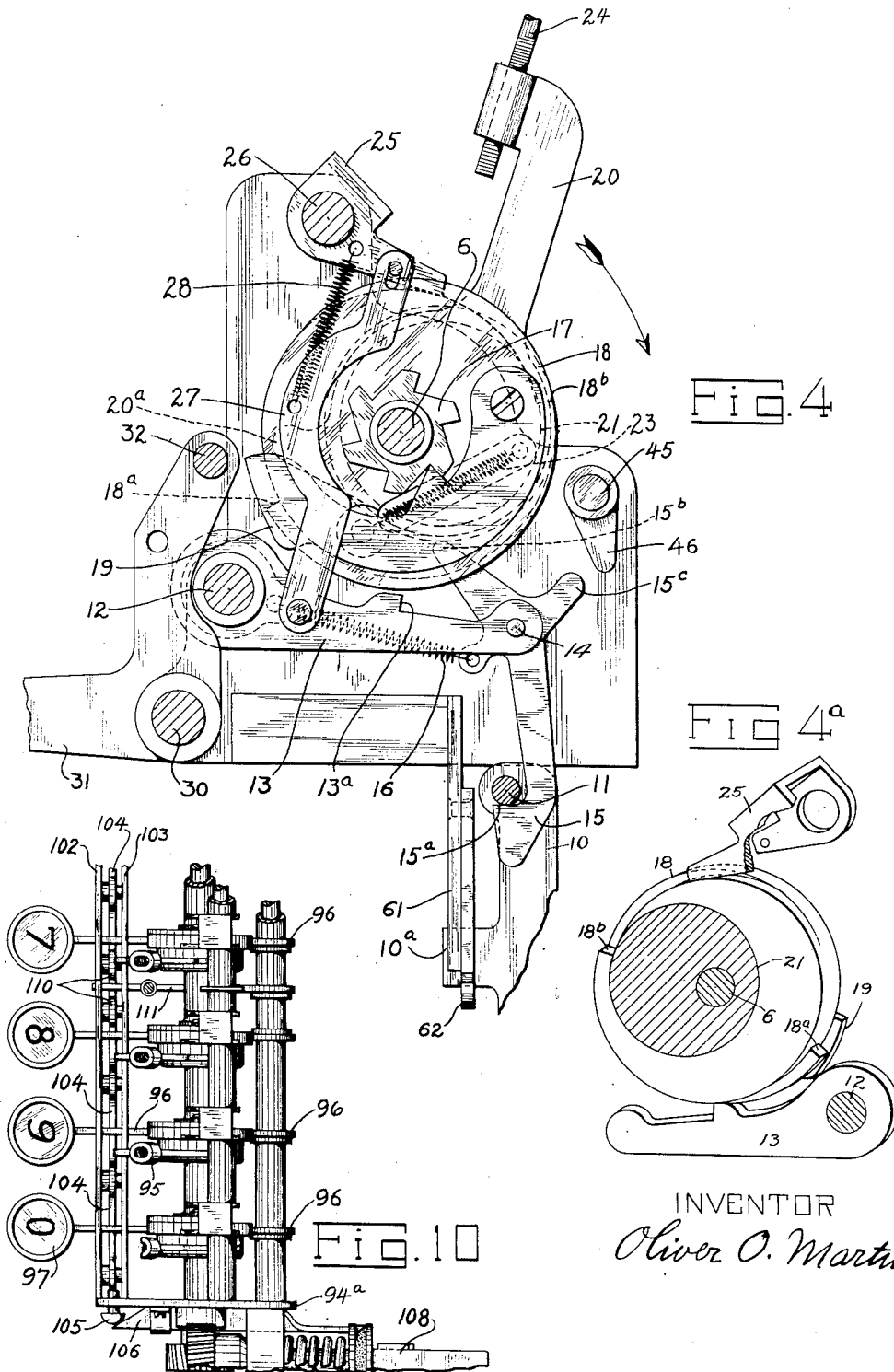
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O. O. MARTIN

CALCULATING MACHINE

Filed May 13, 1921

6 Sheets-Sheet 3



INVENTOR
Oliver O. Martin

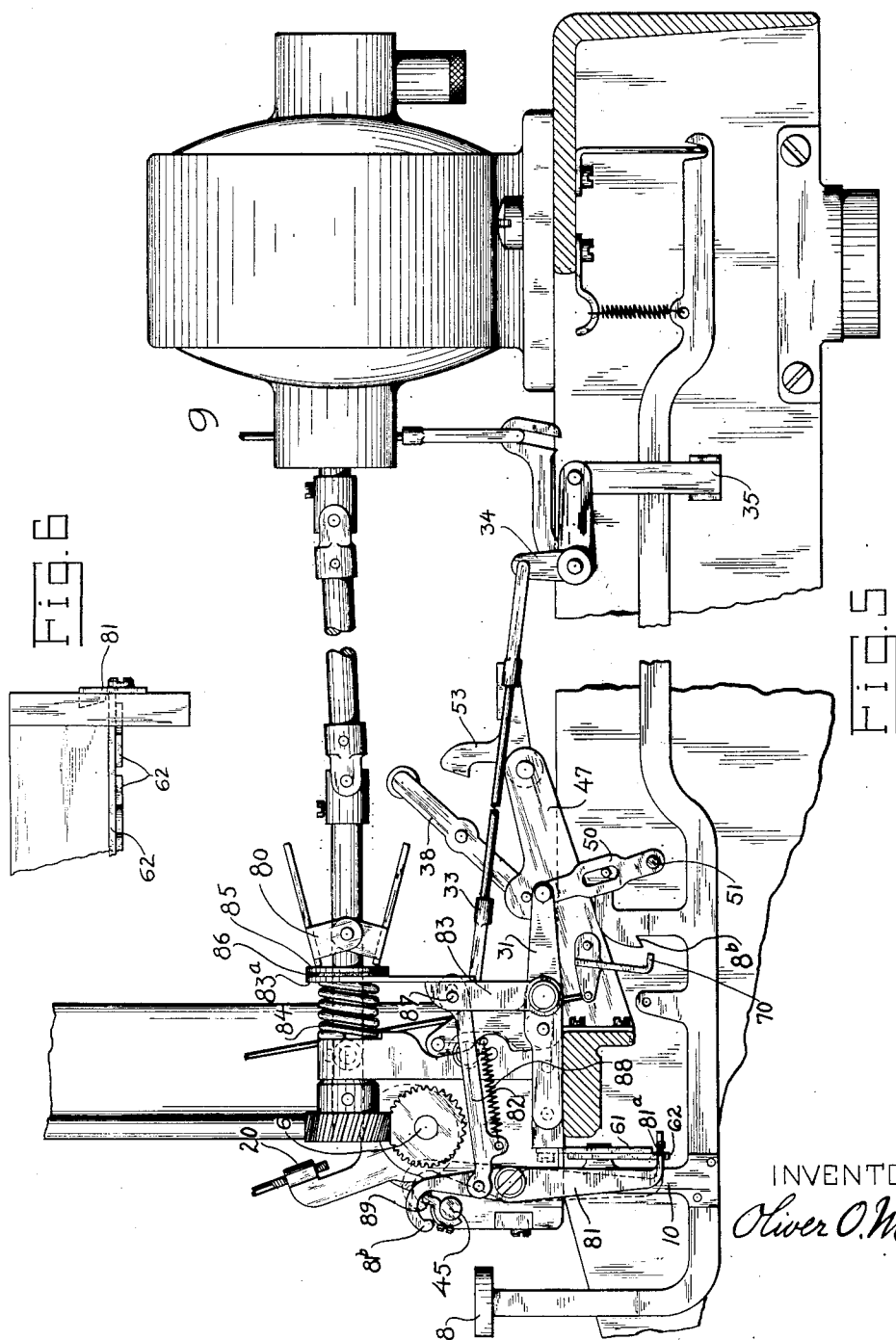
Feb. 3, 1925.

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O. O. MARTIN
CALCULATING MACHINE

Filed May 13, 1921

6 Sheets-Sheet 4



INVENTOR:
Oliver O. Martin

Feb. 3, 1925.

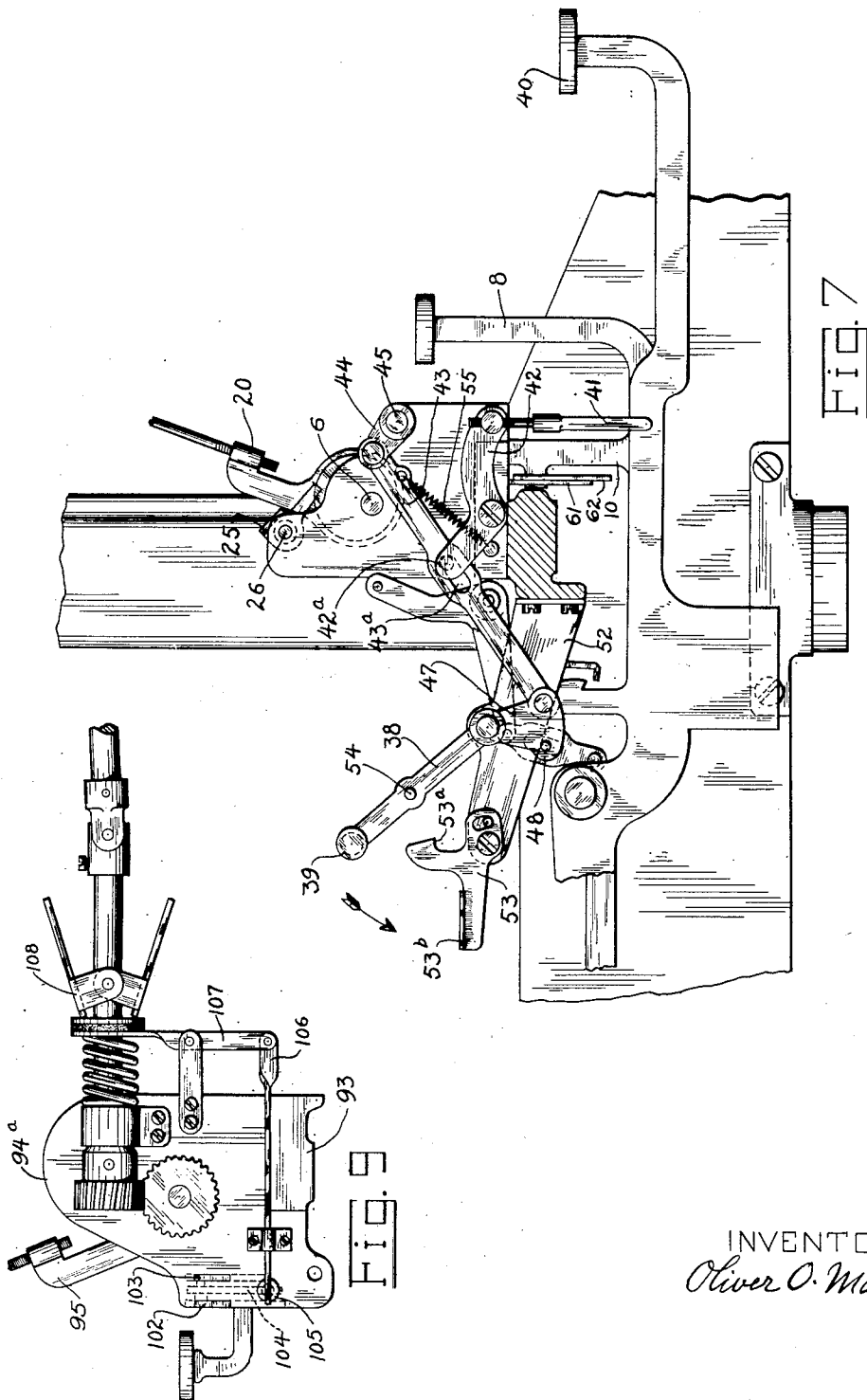
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O. O. MARTIN

CALCULATING MACHINE

Filed May 13, 1921

6 Sheets-Sheet 5



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Feb. 3, 1925.

1,525,311

O. O. MARTIN

CALCULATING MACHINE

Filed May 13, 1921

6 Sheets-Sheet 6

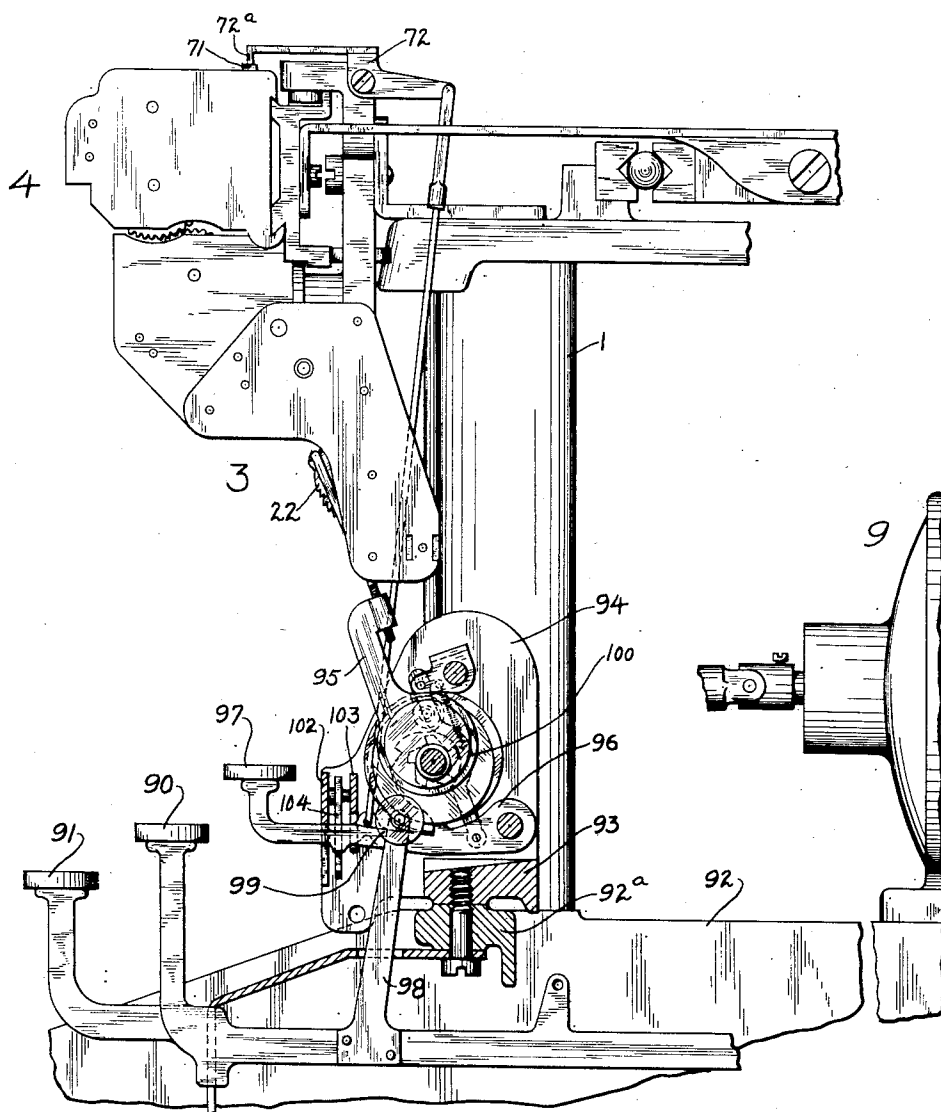


Fig. 3

INVENTOR
Oliver O. Martin

Patented Feb. 3, 1925.

1,525,311

UNITED STATES PATENT OFFICE.

OLIVER O. MARTIN, OF CHICAGO, ILLINOIS, ASSIGNOR TO REMINGTON ACCOUNTING MACHINE CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

CALCULATING MACHINE.

Application filed May 13, 1921. Serial No. 469,200.

To all whom it may concern:

Be it known that I, OLIVER O. MARTIN, a citizen of the United States, residing at Chicago, Cook County, State of Illinois, have invented new and useful Improvements in Calculating Machines, of which the following is a specification.

This invention has relation to computing devices, and it is particularly directed to means for operating such devices.

A certain type of adding-subtracting machines is designed for attachment to typewriting machines, and the digit mechanism of such devices is ordinarily connected with the numeral keys of the typewriter, with the result that the digit which the key represents is registered in the computing machine each time the key is depressed. It is well known that the less force an operator is compelled to exert in depressing the keys of the typewriter, and the more rapidly the keys of the typewriter may be operated, the greater the usefulness and the commercial success of the machine, and anything which tends to interfere with such free operation of the typewriter is considered objectionable. Certain computing attachments of the type herein considered, such as the Wahl adding and subtracting machine in connection with which I have described the invention, are designed to be operated at very high speed, but the force required to operate such machine in combination with the typewriter to which it is attached, is necessarily much greater than the force needed for the operation of the typewriter alone. It is also found that a different key-touch is required, and that the operator is compelled to change from the ordinary snappy typewriter touch to an even stroke carrying the key to the bottom of its movement every time a numeral key is depressed.

The principal object of my invention is the provision of driving means for such computing machine capable of taking the extra load from the typewriter key, in order that the regular typewriter touch may be employed continuously. A further object is the provision of means for the purpose specified and attachable to such typewriter-computing machine without altering the construction of the machine. Another object is to provide a mechanism compact enough to fit into the very limited space above the typewriter keyboard and below the computing

machine, and yet substantial enough to endure the severe strain which such devices are subjected to.

The further objects of the invention and its numerous features of special importance will be readily appreciated upon reading the following description; they are concisely set forth in the annexed claims; and they are fully illustrated in the appended drawings, of which:

Fig. 1 is a sectional side elevation through a typewriter-computing machine embodying the invention, and all such parts as are not necessary in order to disclose the method of attaching the devices to the typewriter have been omitted for the sake of clearness.

Fig. 2 is a front elevation substantially in agreement with the preceding figure, except that the Wahl mechanism has been omitted.

Fig. 3 illustrates in front elevation portions of the computing machine shown in Fig. 1 and discloses certain elements of my invention.

Fig. 4 shows, on a larger scale, the main portion of the structure of my invention separated from the entire combination of Fig. 1. In this figure a key is depressed and the main drive shaft has made a part of a rotation.

Figure 4^a is a perspective view of one of the digit disks as viewed from a point above, behind and to the right of it, said disk being in about the position shown in Fig. 4.

Fig. 5 is a right-hand side elevation of my device indicating the various means whereby the structure is interconnected with the typewriter.

Fig. 6 is a plan view of certain details appearing in Figs. 2 and 5.

Fig. 7 illustrates the structure as viewed from the left-hand end.

Fig. 8 shows a modified form of the invention, and

Figs. 9 and 10 are detail views of portions of the said modified structure.

Reference is invited, in the first instance, to Figs. 1, 2 and 3. The numeral 1 denotes the frame of a typewriting machine, and this frame is made with a cross-member 1^a, on which the main portion of my invention is supported. The said main portion, 2, is (as will presently be explained) suitably connected to operate the actuator 3 of the computing machine, and above said actua-

tor is slidably supported an accumulator or totalizer 4, such as is ordinarily employed in connection with this type of actuating mechanism. The mechanism 2 is connected to be
 5 driven from a suitable source of power, such as an electric motor 9, the connections of which are best shown in Fig. 5, and which will be referred to later.

In the mechanism 2 is a shaft 6, which
 10 is constantly rotated by the motor 9, at high speed, toward the front of the machine, i. e., in counterclockwise direction as viewed from the right. On this shaft is journaled a series of devices, which for the purpose of
 15 this description may be termed oscillators or, preferably, digital transmitters, since there is one such device for each numeral or digit key 8 of the typewriter, as best seen in Fig. 2. Each of these devices transmits to
 20 the balance of the mechanism the necessary motion from the power shaft 6. When a key 8 is depressed the transmitter corresponding to said key is caused to be connected to the shaft 6 during one complete revolution of
 25 said shaft, and the transmitter operates upon the corresponding digit mechanism of the actuator 3 to register a number in the accumulator 4. From this brief description it is seen that the function of the power
 30 driven mechanism 2 is to operate the actuator 3, and for this reason said mechanism may conveniently be termed a sub-actuator.

In Fig. 4, the subactuator and its connections are shown on a larger scale, in order to
 35 bring out the details which will now be described. To each of the numeral keys 8 is rigidly attached a vertically disposed arm 10, and this arm terminates at the top in a head, to which is fixed a laterally projecting
 40 stud 11. A stationary rod 12 extends across the sub-actuator, and on this rod is hung, in properly spaced relation to the arms 10 of the numeral keys, a series of trip levers
 45 13. Said levers are held elevated by light springs and they extend forward, their front ends carrying studs 14. On each of the latter is pivotally hung a trip pawl 15, having a shoulder 15^a disposed in the path of travel
 50 of the key lever stud 11, and the pawl is yieldingly maintained in the path of the said stud by suitable means, such as a light spring 16.

To the continuously rotating shaft 6 are
 55 rigidly secured a series of ratchet wheels 17, and these wheels are properly spaced relative to the trip levers and the keys. Adjacent to each ratchet wheel is hung one of the above mentioned transmitters which comprises a concentric disc 18 rigidly combined
 60 with an eccentric disc 21 best shown in Fig. 1. The disc 18 is made with a shoulder 18^a, which normally, as indicated in Fig. 1, abuts a shoulder 13^a of the trip lever 13. On the side of the disc 18 is hung a ratchet pawl 19,
 65 and this pawl is, by a spring 23, urged into

engagement with the ratchet wheel 17, but it is normally retained out of such engagement by the fact that the end of the pawl abuts the
 said shoulder 13^a of the trip lever. On the
 70 eccentric 21 is hung a strap 20, which, through the medium of an adjustable rod 24, connects the sub-actuator with the actuator 3. A series of back-lash pawls 25 are hung on a rod 26, above the transmitters, and each
 pawl engages a shoulder 18^b of the disc 18. 75

A depression of one of the key levers causes the stud 11 to travel downward, and when the key lever approaches the limit of its stroke the stud 11 reaches and carries
 80 downward the trip pawl 15, thereby tripping the lever 13. One of the peculiarities of the regular key touch is that the operator's finger does not follow the key to the bottom, and as the trip mechanism is not
 85 engaged until the bottom of the stroke is nearly reached, it follows that the key operation, or touch, remains unchanged so far as the operator is concerned. The power required to trip the lever 13 is so slight that it
 90 does not influence the operation of the typewriter. The moment the trip lever is withdrawn the ratchet pawl 19 is released and drawn into engagement with the adjacent
 95 ratchet wheel, which then picks up the transmitter and imparts a rotation to the latter. At the end of the rotation the end of the pawl 19 swings into the path of the trip
 lever shoulder 13^a, and, as a consequence, the
 100 pawl is raised out of engagement with the ratchet wheel, whereupon the oscillator comes to a stop when the shoulder 18^a comes into contact with the shoulder 13^a. It is important to note that the spring 23 of the
 105 ratchet pawl acts as a buffer spring, and I wish to point out that the parts have been so neatly proportioned that the oscillator comes to a stop very gently, no sound of a blow
 being discernible. The back lash pawl 25
 110 drops into place simultaneously, and the pawl spring 23 urges the transmitter against this pawl. This is also important because it operates to maintain the mechanism under
 tension, whereby rattling noises are eliminated. The two pawls 13 and 25, acting on
 115 the disk 18 in opposite directions, retain said disk and the eccentric 21 in correct normal position.

The lever 13 and the pawl 25 are shown
 connected by a link 27, and a spring 28
 120 extends from this link to the said pawl. At the place where the link is pivoted at one end it has a slot whereby it is given
 sufficient freedom to permit of depressing the lever, 13 but no more freedom. When the transmitter rotates the pawl 25 gradually
 125 rises to the high part of the periphery of the disc 18, and during this rising movement, it draws the trip lever upward and into the path of the shoulder 18^a. The trip lever is thus positively returned, which is very 130

important and absolutely necessary, for were it not so, and if the operator absent-mindedly held the key depressed, then the machine would as a consequence repeat; but as the lever is positively returned the operator will feel a slight blow against his finger, if he attempts to hold the key depressed, and he will know that he must confine himself to the use of the ordinary typewriter touch.

Another condition is to be guarded against. Where the key is struck a very rapid blow it may happen that the key lever gets back before the transmitter has completed a rotation, and that it then rebounds, causing a second release of the trip lever. I have safeguarded against this condition by swinging the trip pawl 15 out of the way at the time such repeating might be possible, and this swinging movement may conveniently be obtained by providing a heel 15^b on the trip pawl and in the path of the eccentric disc 21.

At the base of the sub-actuator is rotatably hung a rod 30, on which is mounted a bail comprising arms 31 and a bar 32, and said bail is by an adjustable rod 33 connected with the typewriter escapement rocker 34. Each eccentric strap 20 is provided with a heel 20^a which, during the rotation of the oscillator, swings into the path of said spacing bar 32, and pushes the bar rearward, thereby operating the escapement. It is to be noted that the numeral keys are relieved directly above the typewriter universal bar 35, so that they will not strike said bar, and that, due to this construction, the typewriter escapement is entirely controlled by the subactuator when the latter is operated.

When, however, the shift key, 40, of the typewriter is depressed, it becomes necessary to release the sub-actuator from operation by the numeral keys, and at the same time to connect said keys to operate the typewriter escapement, and mechanism suitable for such purpose is illustrated in Figs. 1 and 7. The shift lever 40 is by a link 41 connected to rock a bell-crank 42, which latter is made with a stud 42^a engaging a perforation 43^a of a connecting bar 43, and this bar is in turn pivotally hung on an arm 44 of a rock-shaft 45. A bar 46 (see Fig. 1), extending across the sub-actuator, is rigidly mounted on said shaft 45, and it takes a position adjacent to a toe 15^c of each trip pawl 15. When the shift key is depressed the movement of the shift lever, through the instrumentalities just described, causes said bar to swing into the path of each toe 15^c, and thereby to swing the trip pawl out of the path of the numeral key stud 11. The lower end of the connecting bar 43 is journaled on a rock-frame 47, which is provided with a stud 48, and this stud engages the arm 50 of a bail suspended from the spacing bar frame 31. Said bail is made

to support a rod 51 which, when the shift key is depressed, takes a position under and in the path of a hook 8^a of each of the numeral key levers 8.

From the foregoing description it is seen that the depression of the shift lever operates to disconnect the sub-actuator and to connect the key lever with the escapement. In case it is desired to maintain the sub-actuator disconnected for a longer period, it is only necessary to lock the mechanism just described in inoperative position in a suitable manner. The mechanism herein provided for this purpose comprises a hand-lever 38 rigidly secured to the rock-frame and provided with a finger-piece 39. On the end of the bracket 52, which supports said rock-frame, is mounted a lock-pawl 53, and this pawl is provided with a face 53^a for engagement with a stud 54 of the lever 38. The operator takes hold of the lever 38 and the lock-lever 53 at the same time and presses the two levers together with the fingers of his left hand until the shoulder 53^a engages the stud 54, and the mechanism remains locked until he again withdraws the lock-lever 53 from the lever 38. Attention is called to a spring 55, which operates upon the bar 43 to urge the parts into normal position, and it will be noticed that the tension of this spring also serves to retain the levers 38 and 53 interlocked, until manually released. It is also important to note that the perforation 43^a of the bar 43, in which the stud 42^a of the bell-crank 42 is seated to operate, is elongated in order that the shift key may remain undisturbed and have freedom of movement while the sub-actuator remains disconnected.

In the actuator 3 of the Wahl mechanism as heretofore constructed there is provided what is termed a single key mechanism, which mechanism permits only one fan to be oscillated at a time, as well known to those versed in the art. This mechanism is very readily removable, and I prefer to remove it because it is not required where the sub-actuator is employed, and also because it retards the key action. A number of other parts operating upon said fans and combining to form a full stroke mechanism may also be removed or omitted, for the reason that the transmitters are proportioned to produce the correct full stroke required, which stroke obviously remains invariable.

The single key mechanism which has been removed from the actuator, or the equivalent of this mechanism, is in the structure of my invention, applied to the numeral key levers, in order that only one such lever may be depressed at one time, for it is obvious that, if a plurality of keys were simultaneously depressed, a collision would result, which would tie up the actuator. To this end I have mounted a single key mechanism

60 adjacent to the arms 10 of the key levers, said mechanism including a plate 61 and a series of rockers 62, similar to the kind ordinarily employed in the Wahl actuator and each arm is made with a projection 10^a, which extends into the path of the rockers 62. This projection is placed a certain distance above said rockers, in order that the projection may enter the single key mechanism at the time the stud 11 reaches the shoulder 15^a of the trip pawl 15. It is important to note that the key lever does not enter the single key mechanism until it has nearly reached the end of its stroke, whereas, in the Wahl actuator, the fan 22 enters at the beginning of the stroke, and remains there until the key has fully returned.

A machine of the Wahl type is adapted for multi-column work, and some columns may contain straight figures, while in other columns punctuations, such as commas and periods, may be interposed, and totalizers are constructed to suit such different conditions, as is commonly known. A space is left vacant in the totalizer at the place where a punctuation occurs, and the operator is supposed to depress the typewriter space bar in order to jump over this space, or to depress the proper punctuation key, both of which operations have no influence upon the computing machine. But the operator may forget that a punctuation is required and attempt to set up the next figure, with the result that he will release the sub-actuator and tie up the machine. Various preventative means may be employed, and in Figs. 1 and 3 I have shown mechanism connected to throw a bar 70 into the path of hooks 8^b of the numeral key levers. On top of the totalizer 4 is secured a plate having one or more V-shaped cams 71 positioned directly above each vacant space in the totalizer. Pivottally mounted on the stationary machine frame is a lever 72 provided with a V-shaped tooth 72^a, said tooth extending downward into the path of the cams 71. The totalizer, traveling with the typewriter carriage, operates upon said tooth to rock the lever and in turn to throw the bar 70 into the path of the key levers, every time one of said cams passes the said tooth, as a consequence of which the depression of the key levers is arrested and the operation of the sub-actuator is prevented. The lever 72 is connected with the rocking frame 70 by a link 73, as shown in Fig. 1.

While the motor is running the sub-actuator must be capable of operation, but suppose the motor suddenly and unexpectedly comes to a stop, or if the operator intentionally stops the motor but forgets to disconnect the sub-actuator, then it becomes necessary to block the operation of the key levers. Otherwise a person may unintentionally or maliciously depress any number

of the numeral key levers successively and thereby release the corresponding transmitters, and it will be very difficult for the operator to detect that the transmitters have been tripped, particularly because a device of this kind invariably is enclosed within a casing. The machine will be tied up if more than one transmitter has been released and the operator then turns on the current to start the motor. Such accident is preventable in various ways, and one means of prevention is illustrated in Figs. 5 and 6, where a spring-held mechanism is provided for locking the single key mechanism while the motor is stopped, and where a centrifugal governor of the motor shaft operates upon said mechanism to release the single key mechanism while the motor is running.

The single key locking mechanism comprises a lever 81, on which is pivotally hung a bar 82, and this bar is urged rearward by a spring 88. The bottom of the lever 81 is bent over horizontally and it terminates in a cam 81^a which, when said lever is tilted by the action of the spring 88, engages the edge of the adjacent single key rocker 62, namely, the end rocker of the series (see Figs. 2 and 6) and crowds said rocker sideways against the next following rockers, thereby closing the space between said rockers, so that no key lever can pass. The governor 80 operates upon an arm 83, and this arm is provided with a lateral stud 87 engaging a perforation in the rear end of the bar 82. When the motor is started and commences to speed up it is found that the governor operates to force the top of said arm 83 forward, against the tension of a strong spring 84, and that the pin 87, of the said arm, simultaneously pushes the bar 82 forward, against the tension of the spring 88, thereby tipping the lever 81 forward sufficiently to release the single key mechanism. Attention is directed to the head of the lever 81, which is bent forward to form a hook 81^b positioned directly above the rock-shaft 45. On the latter is mounted an arm 89, and this arm is free to rock with the shaft within said hook, while the motor is running. When the motor stops, however, and the lever 81 as a consequence is drawn rearward, it is found that the hook also is moved rearward until it touches said arm 89, as indicated in dotted outline in Fig. 5. In this position the single key mechanism is locked, as explained, and the numeral keys of the typewriter are made inoperative, but I have shown that the sub-actuator can be permanently disconnected by throwing the hand-lever 38, which movement causes the shaft 45 to rock, carrying with it the arm 89, which in turn operates upon the hook 81^b to tilt the lever 81 and thereby to release the single key mechanism. The perforation of the bar 82, in which the stud 87 rides, is made sufficiently elongated

to permit the bar and lever to be moved, as just explained, without disturbing the governor connections, and without adding the extra load of the spring 84. Between the governor and the arm 83 it is well to place suitable elements, such as a washer 85 and a soft pad 86, for the purpose of reducing friction and consequent wear on the parts.

It has some advantages to provide the structure of my invention with an independent set of numeral keys, and such a modified structure is shown in Figs. 8, 9 and 10. But in order to employ such modified device it becomes necessary to provide more room than most typewriting machines afford. In the Remington machine, which is the type of machine indicated in the drawings, it is possible to obtain such extra space by lengthening the key levers 90, 91 substantially as shown. The sub-actuator, on the other hand, becomes much simplified, because much of the hereinbefore described connections can be omitted.

On the cross bar 92^a of the typewriter frame 92 is mounted a base 93 which, with the side pieces 94, 94^a (see Figs. 9 and 10) constitute a sub-actuator frame in every important respect similar to the frame of the structure described. The digital transmitters and the eccentric straps 95 may also remain substantially as described, and the trip-levers 96 are mounted to hold said transmitters inoperative in exactly the manner stated. But the trip pawl 15 is omitted in this structure, and in its place the trip levers have been made to extend forward and to terminate in a series of keys 97. When one of these keys is depressed, the corresponding transmitter is caused to be released, and a number is set up in the computing machine, as described. To each numeral key 90 of the typewriter has been affixed a vertically disposed arm 98, and this arm is formed at the top to support a rotatable roller 99, which latter takes a position directly beneath the eccentric 100. The function of these elements is to operate the key lever. It has been stated that the device is capable of operating at high speed (a speed of eighteen hundred revolutions per minute having been recorded), as a consequence of which the depression of the key lever, caused by the eccentric engaging said roller, is performed at a speed at least as high as that attained by the ordinary finger depression. It is important to note that, due to the peculiarity of the eccentric movement, the beginning of the key stroke is relatively slow and increasing toward the end of the stroke, and this is the ideal typewriter key stroke to employ. In operating this form of the invention, typewriting can be done without calculating by using the typewriter keys 90 and 91, which do not affect the computing mechanism. When the computer keys are used,

the motor operates the corresponding numeral keys 90 and thus prints the computed numbers.

The single key mechanism is in this structure applied directly to the trip levers 96, and it comprises a pair of plates 102, 103, mounted in spaced relation, between which the rockers 104 are pivotally hung, and the trip levers are positioned directly above said rockers in order that the least depression of a key will bring its lever into the single key mechanism. The typewriter key-lever-escapement connections have been restored, as no connection between the sub-actuator and the escapement is required, but a mechanism for closing the single key mechanism when the motor is stopped is, of course, required here as in the first structure described. Such mechanism is indicated in Figs. 9 and 10, where a pin 105 is shown slidably fitted in the side piece 94^a of the sub-actuator frame, said pin having its inner end abutting one of said rockers 104, the last rocker to the right. The outer end of the pin is operated upon by a cam bar 106 to crowd said rocker against the next following rockers, and thereby to lock the single key mechanism, when the motor is stopped. The bar 106 is, by a lever 107, connected to be moved by the action of the centrifugal governor 108, which latter may be identical with the governor hereinbefore described.

In the first mentioned structure mechanism was described for locking the key levers in the punctuation spaces of the totalizer, whereas in this case it is required to lock the trip levers 96. To this end I have detached one of the rockers 104, and in its place I have placed a pair of half-size rockers 110. A special lever 111 has been provided for operation between said half-size rockers, and this lever is connected, through the medium of an adjustable rod, with the lever 72 of the actuator frame. It is readily seen that the tilting of said lever, as hereinbefore explained, results in a depression of the lever 111, which lever instantly enters between the said two rockers 110 and thereby locks the single key mechanism.

I claim:

1. In a sub-actuator, a power driven shaft, a series of ratchet wheels rigid on the shaft, a disc adjacent to each wheel and having a pawl urged into engagement with said wheel, a depressible lever normally maintaining said pawl disengaged, a back-lash pawl, and connections between said pawl and lever for positively restoring the lever after each depression, so as to stop the disc at the end of a complete revolution.

2. The combination with a typewriter and an actuator, of a series of eccentric carrying discs for oscillating digit members of said actuator, a power driven shaft for rotating said discs, a lever for holding each disc un-

turned, said lever depressible to release the disc for rotation by said shaft, a back-lash pawl riding on the periphery of the disc, a bar positively connecting said pawl and lever so as to restore the lever as the pawl rises on the peripheral cam of said disc, said bar provided with an elongated perforation at one pivotal point in order that the lever may be depressed to release said disc, and a yielding member constantly urging the pawl and lever together.

3. The combination with a typewriter and an actuator, of a prime mover, a sub-actuator having digit members connected to operate the digit members of said actuator, keys for releasing the digit members of said sub-actuator to be rotated by said prime mover, a single key mechanism, and means for maintaining said single key mechanism open for key operation while the said prime mover is running and closed while said prime mover is not running.

4. The combination with a typewriter and an actuator, of a sub-actuator comprising a series of rotatable members for operating the digit mechanism of said actuator, a prime mover for rotating said members, keys for releasing the members for rotation, means permitting the release of only one member at a time, and means for preventing the release of said members when the prime mover is stopped.

5. The combination with a typewriter and an actuator, of a sub-actuator including a series of rotatable digit members connected to operate said actuator, a prime mover for rotating said digit members, a trip lever maintaining each member unturned, an arm secured to each key lever of the typewriter, a pawl on each trip lever and yieldingly maintained in the path of travel of said arm, said pawl operated upon by a stud of said arm to release the digit member when the key lever is depressed; and means operated by said prime mover for moving said pawl out of the path of said stud.

6. The combination with a typewriter and an actuator, of a series of power driven members connected to operate said actuator, a prime mover, a series of keys for releasing said members for rotation by said prime mover, means permitting the release of only one member at a time, means operating to hold said members unreleasable while the prime mover is stopped, and means for disconnecting said members from operation by said keys.

7. The combination with a typewriter and an attached computing machine, of a series of power driven members connected to operate said computing machine, a series of trip levers normally holding said members unturned, a trip pawl on each lever, a pin on each numeral key of the typewriter for engagement with said pawl to release the

corresponding member when the key lever is depressed, and manual means operable to withdraw said pawl from the path of travel of said pin.

8. The combination with a typewriter and an attached computing machine, of a sub-actuator, a motor connected to operate said sub-actuator, a series of keys for releasing the digit members of the subactuator, a single key mechanism for said keys, means yieldingly urging said single key mechanism into locked position when the motor is stopped in order to prevent key depression, and means coming into action upon starting the motor for releasing said mechanism for key depression.

9. The combination with numeral keys, computing mechanism, and power driven means for operating said computing mechanism under the control of said keys, of connections whereby said keys control said power driven mechanism, and means acting automatically to lock said numeral keys when the power is turned off.

10. The combination with numeral keys, computing mechanism, and a continuously rotating driver for said computing mechanism, of connections whereby said keys control the action of said driver on said computing mechanism, and means acting automatically to lock said numeral keys when said continuously rotating driver is stopped.

11. The combination with numeral keys, computing mechanism, a continuously rotating device for actuating said computing mechanism, and connections whereby said keys control the action of said rotating device on said computing mechanism, of a lock for said keys, and a centrifugal device on said rotating device connected to release said lock by the rotation of said rotating device.

12. The combination with typewriting mechanism including numeral keys, computing mechanism, a power driven actuator for said computing mechanism, and connections whereby said keys may control said actuator, of a lock acting automatically to lock said keys when the power mechanism is inoperative, means operable at will to disable said key connections and thereby the computing mechanism, and means connected with said disabling means for releasing said lock.

13. The combination with typewriting mechanism including numeral keys, letter keys, a carriage, and carriage feed mechanism; computing mechanism; a power actuator for said computing mechanism; and controlling connections from said numeral keys to said actuating mechanism, of means operable at will for connecting said connections and for disconnecting them to enable independent operation of the typewriting mechanism, and means controlled by said connecting and disconnecting means for shifting the control of said carriage feed

mechanism to said power actuator when the latter is in operation and to said numeral keys when said actuating mechanism is out of operation.

14. The combination with typewriting mechanism including numeral keys and letter keys, computing mechanism, and connections whereby said numeral keys may control said computing mechanism, of means for connecting and disconnecting said connections, carriage feed mechanism including a universal bar for the letter keys but not operated by the numeral keys, a special universal bar for said numeral keys, means whereby said computing mechanism may operate said carriage feed mechanism, and connections from the last mentioned means and from said special universal bar to said connect and disconnect devices whereby when the computing mechanism is in operation it controls the carriage feed and whereby when said computing mechanism is out of operation the carriage feed by the numeral keys is controlled through said special universal bar.

15. In a machine of the class described, the combination with a power driven digit disk, of a trip dog adapted to arrest said disk, a pawl adapted to prevent back-lash of said disk, and means whereby said back-lash pawl positively restores said trip dog to arresting position.

16. In a machine of the class described, the combination with a power driven digit disk, of a trip dog engaging a shoulder of said disk to prevent forward rotation of the latter, a pawl engaging said disk to prevent back-lash of said disk, and a lost motion connection between said back-lash pawl and said trip dog, whereby said pawl positively restores said dog to operative position.

17. In a machine of the class described, the combination with a continuously rotating shaft, a ratchet wheel fast on said shaft, a disk loose on said shaft and having a driving pawl adapted for engagement with and disengagement from said ratchet wheel, of a trip dog normally engaging a shoulder of said disk to prevent forward rotation thereof and also engaging said pawl to hold the latter away from said ratchet wheel, a second pawl engaging said disk to prevent back-lash thereof, a lost motion connection and a spring connecting said pawl and said dog, and means whereby in the course of its rotation said disk raises said pawl and through said connection positively moves said dog into operative position, said pawl thereafter snapping down behind its engaging shoulder.

18. In a combined typewriting and calculating machine, the combination with typewriting mechanism, and calculating mechanism including an actuator mounted

above the typewriter keyboard, of a power sub-actuator below said actuator and connected with said actuator by a series of digital links, said sub-actuator including a power shaft, a series of eccentrics for operating said links, and means for coupling said eccentrics one at a time to said power shaft.

19. In a combined typewriting and calculating machine, the combination with the printing keys and carriage of the typewriter, and calculating mechanism, of a power drive including a power-driven part and a series of key controlled digital transmitters, of carriage feed mechanism including a universal frame, means whereby said frame may be operated by said digital transmitters, means whereby said frame may be operated by said keys, and means for shifting from one such operation to the other.

20. In a calculating machine, the combination with calculating mechanism and a traveling carriage, of a power drive for said calculating mechanism comprising a series of digital eccentrics and straps and means for driving said eccentrics one at a time, heels on said eccentric straps, and a universal member operated by said heels for feeding said carriage.

21. In a combined typewriting and calculating machine, the combination with typewriting mechanism including a case shift key, calculating mechanism, and a power drive for said calculating mechanism, of means whereby said power drive is controlled by the numeral keys of the typewriter, and means whereby an operation of said case shift key disconnects said power drive.

22. In a combined typewriting and calculating machine, the combination with typewriting mechanism including carriage feed mechanism and a case shift key, calculating mechanism, and a power drive for said calculating mechanism, of means whereby said power drive is controlled by the numeral keys of the typewriter, means whereby said carriage feed mechanism is operated by said power drive, and means whereby an operation of said case shift key disables said power mechanism and connects said carriage feed mechanism directly with said numeral keys.

23. In a combined typewriting and calculating machine, the combination of typewriting mechanism including a universal bar operated by the letter keys but not by the numeral keys of the typewriter, a special universal bar shiftable into and out of position to be operated by said numeral keys, calculating mechanism, a power drive for said calculating mechanism, means whereby said power drive may operate said carriage feed mechanism, and means whereby said case shift key disables said power

drive and shifts said special universal bar typewriter, means whereby said power
into position to be operated by said numeral drive may operate said carriage feed mecha- 15
keys. nism, hand operated means for disabling

24. In a combined typewriting and cal-
5 culating machine, the combination of type-
writing mechanism including a carriage
feed mechanism, said carriage feed mecha-
nism including a universal bar operated by
the letter keys but not by the numeral keys
10 of the typewriter, calculating mechanism,
a power drive for said calculating mecha-
nism, means whereby said power drive may
be controlled by the numeral keys of the
said typewriter, means whereby said power
drive may operate said carriage feed mecha- 15
nism, hand operated means for disabling
said power drive and for connecting said
numeral keys to operate said carriage feed
mechanism, a case shift key, and means
whereby said case shift key may tempo- 20
rarily operate said disabling means and said
means for connecting the numeral keys to
the carriage feed mechanism.

In testimony whereof I have hereunto
affixed my signature.

OLIVER O. MARTIN.