

No. 842,232.

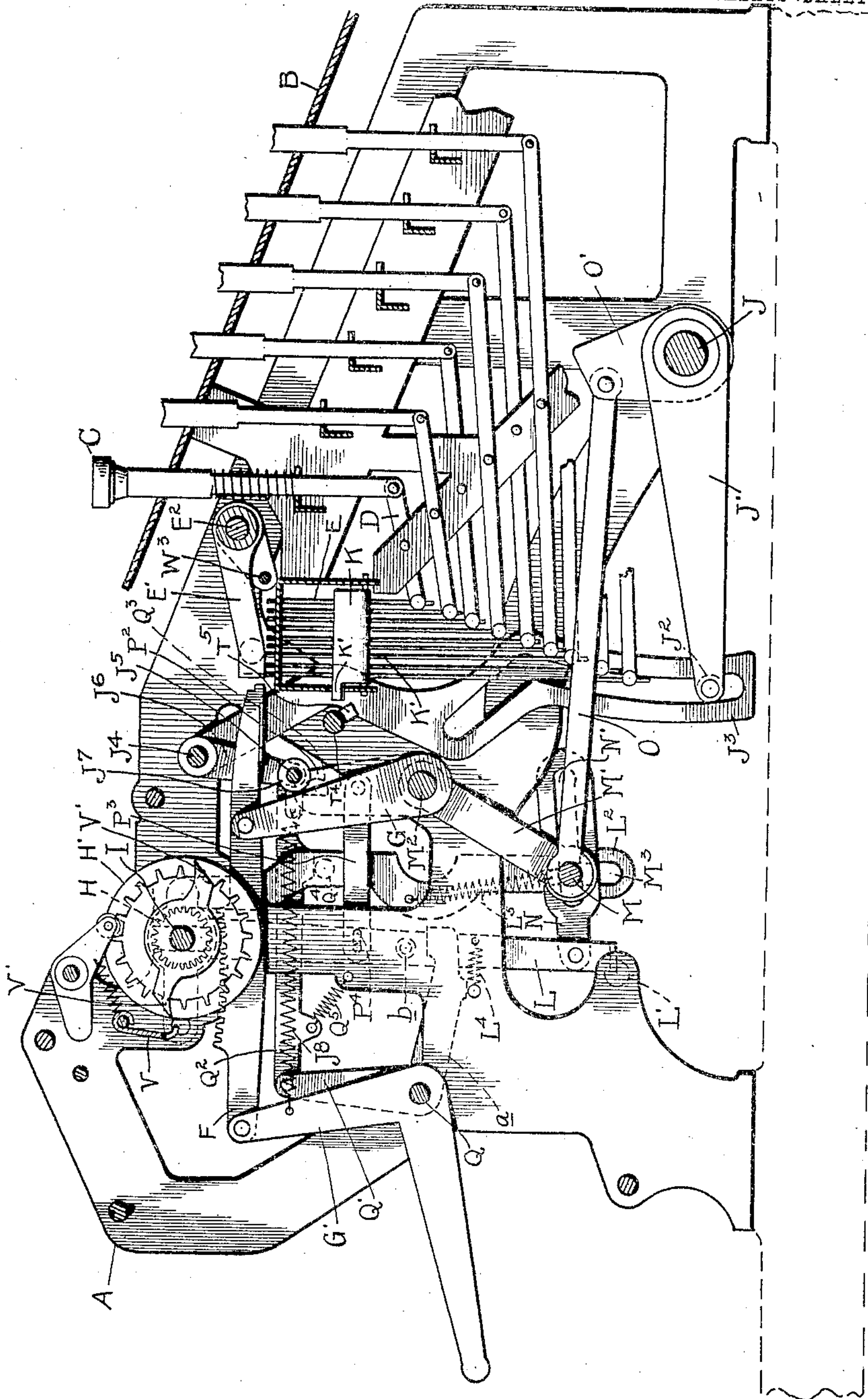
PATENTED JAN. 29, 1907.

C. N. McFARLAND.
ADDING MACHINE.

APPLICATION FILED MAY 14, 1906.

4 SHEETS-SHEET 1.

FIG. 1.



WITNESSES

Geo. H. Gurnea
Edward A. Gurnea BY

INVENTOR
CHARLES N. McFARLAND.

Whittemore, Hubert & Whittemore
ATTYS.

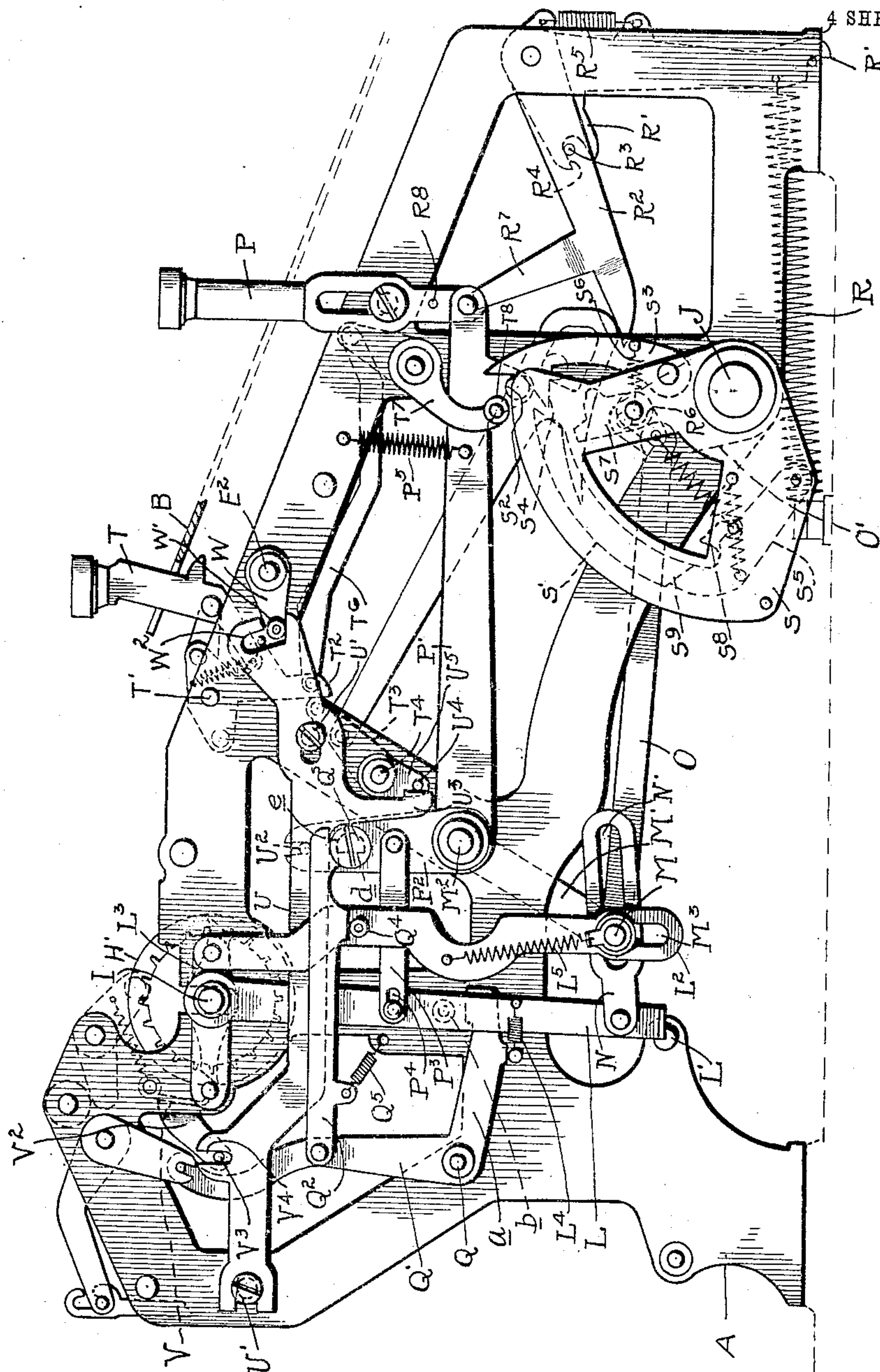
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4 SHEETS—SHEET 2.



WITNESSES

Geo. H. Quinn
Edward & Co. BY

INVENTOR
CHARLES · M · MCFARLAND.

Whittemore, Hubert & Whittemore

ATTYS.

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4 SHEETS—SHEET 3.

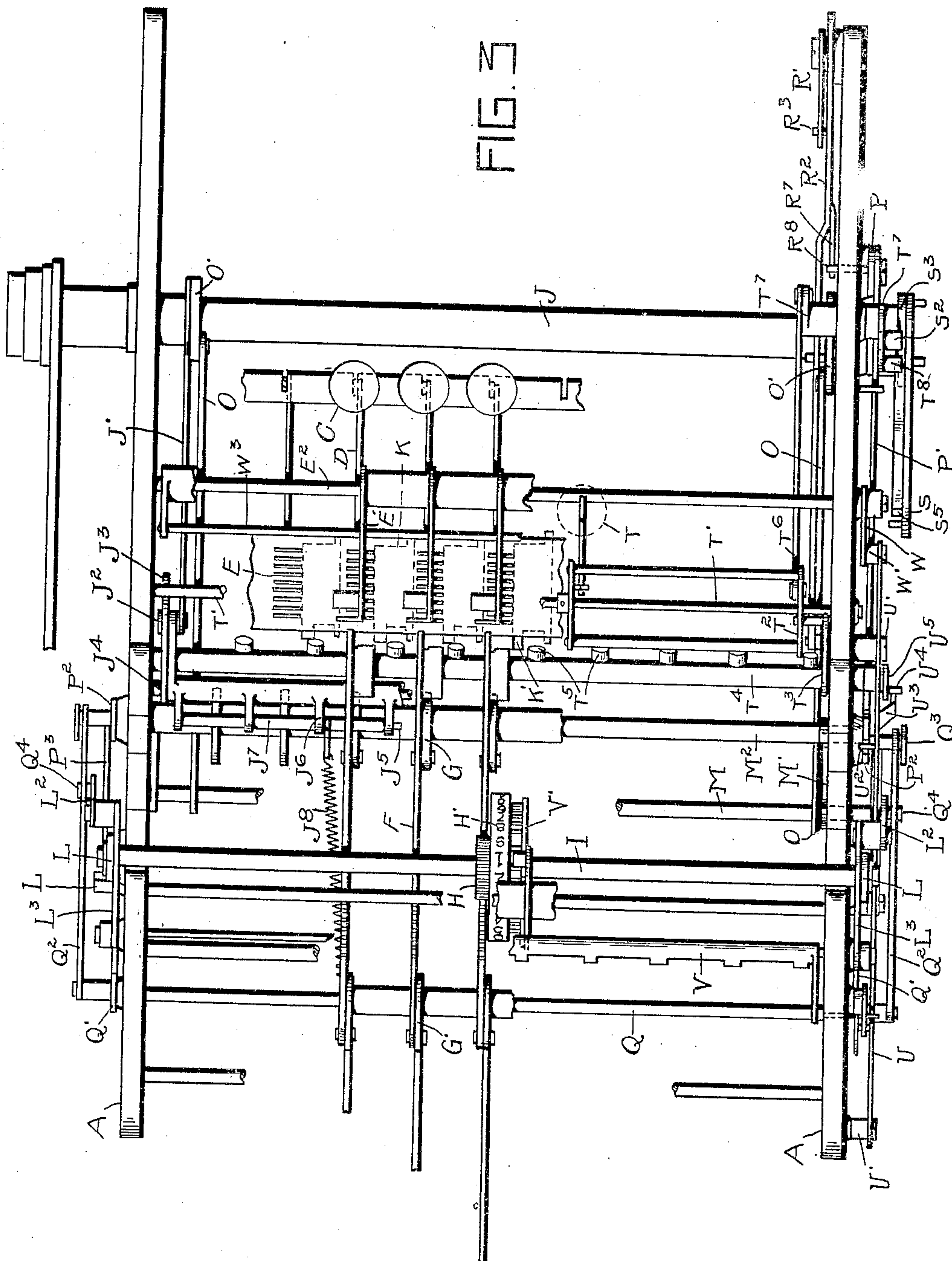


FIG. 3

WITNESSES

Geo. H. Gause
Edward A. Cault BY

INVENTOR

CHARLES N. McFARLAND.

Whittemore, Hulbert & Whittemore

ATT'YS.

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4 SHEETS—SHEET 4.

FIG. 4.

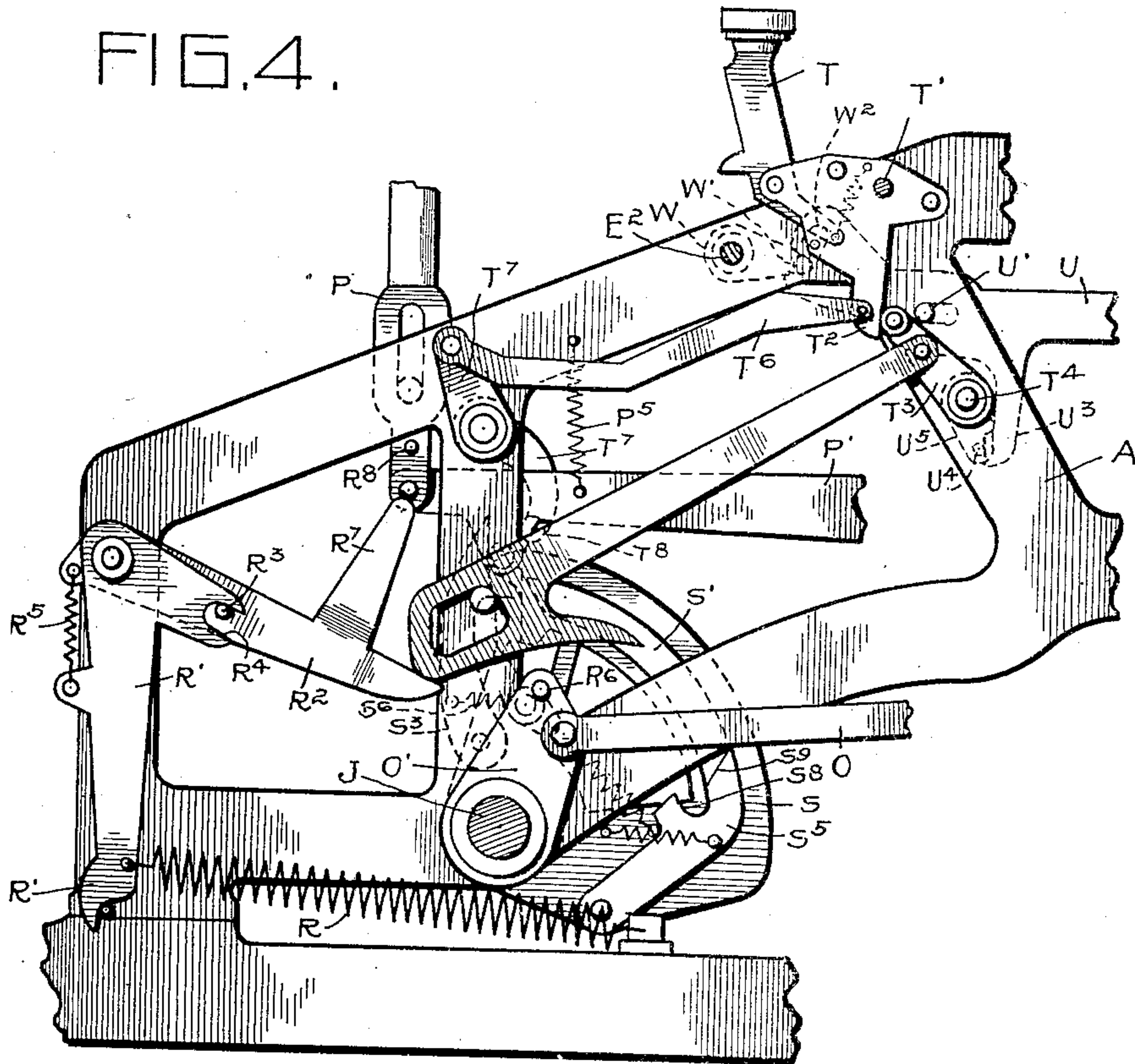


FIG. 5.

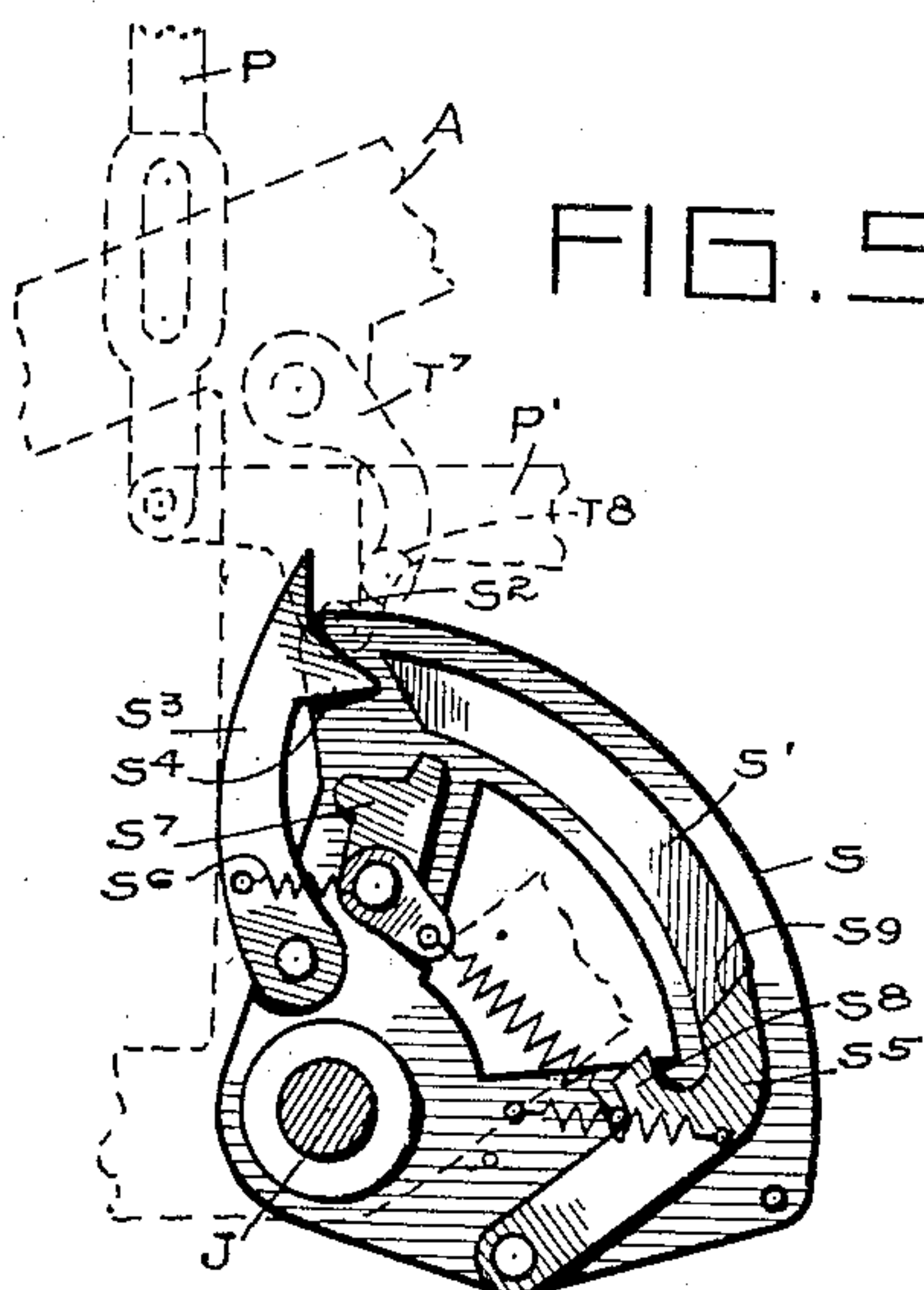
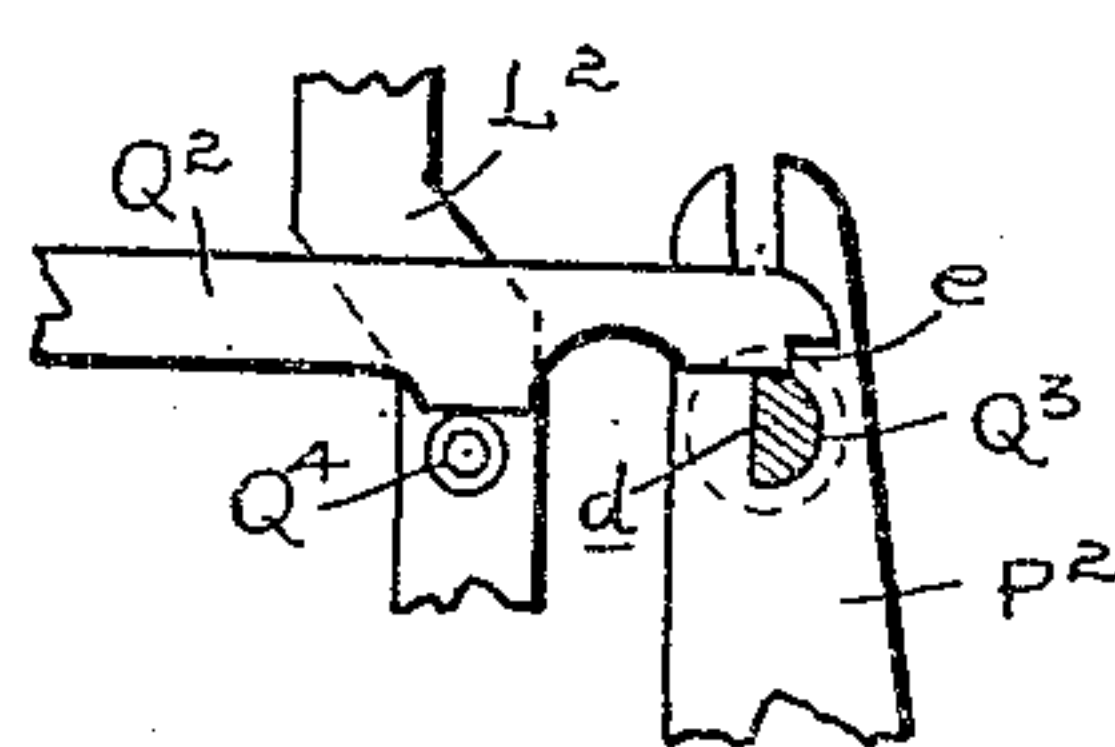


FIG. 6.



WITNESSES

Gen. H. C. Swer
Edward Tuck. BY

INVENTOR
CHARLES · N · M^cFARLAND.

CHARLES H. McFARLAND.
Whittemore Hulbert & Whittemore
ATT'YS.

UNITED STATES PATENT OFFICE.

CHARLES N. McFARLAND, OF DORRANCETON BOROUGH, PENNSYLVANIA,
ASSIGNOR TO THE ADDER MACHINE COMPANY, OF KINGSTON BOR-
OUGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

ADDING-MACHINE.

No. 842,232.

Specification of Letters Patent.

Patented Jan. 29, 1907.

Application filed May 14, 1906. Serial No. 316,827.

To all whom it may concern:

Be it known that I, CHARLES N. McFARLAND, a citizen of the United States of America, residing at the borough of Dorranceton, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Adding-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to adding-machines of the type in which a series of items of indefinite length may be added and recorded, means being also provided for recording a total at any point in the series and for clearing the machine before beginning a new series.

The invention consists in the peculiar construction of mechanism employed with particular reference to the means for totalizing and clearing, as hereinafter set forth.

In the drawings, Figure 1 is a longitudinal section through the machine. Fig. 2 is a side elevation. Fig. 3 is a plan broken away at various points to illustrate different portions of the machine. Fig. 4 is an elevation of the mechanism adjacent to the inside of the frame. Fig. 5 is an elevation of the reverse side of locking mechanism illustrated in Fig. 2, and Fig. 6 is a vertical elevation of a portion of Fig. 2.

In general construction the machine comprises a suitable framework A, to which is attached a keyboard B, comprising a plurality of series of keys, each series containing the numerals from "1" to "9" and corresponding to one denomination of the numbers added and recorded. Each individual key C is suitably connected, as by the lever D, with a vertically-movable stop-rod E, all of the rods of a single series being arranged in alinement and in the path of a reciprocatory rack-bar F. This rack-bar is carried by swinging links G G', the latter constituting the actuating connection for the printing or recording mechanism, and said rack-bar is adapted for engagement with a corresponding pinion H, connected to a register-wheel II', a series of these register-wheels being sleeved upon a shaft I, extending across the machine. The shaft I is secured in vertically-adjustable bearings in opposite sides of the frame, and mechanism is provided (as will be hereinafter

described) for raising and lowering said shaft, so as to disengage or engage all of the pinions with their corresponding rack-bars.

The mechanism of the machine is actuated by a suitable crank-handle secured to a rock-shaft J, extending transversely of the frame. J' is a rock-arm on this shaft, which is provided with a roll J², engaging a slotted rock-arm J³, secured to a rock-shaft J⁴.

J⁵ is a universal bar secured to rock-arms J⁶ upon the shaft J⁴ and provided with anti-friction-rolls J⁷ thereon, which in normal position of parts bear against the respective links G, connected to the racks F. The bar J⁵ has also attached thereto a series of springs J⁸, the opposite ends of which are attached to the links G', the arrangement being such that the rocking forward of the bar J⁵ will simultaneously withdraw the rolls J⁷ from the path of the links G and place a tension upon the springs J⁸, which will yieldingly draw the rack-bars F forward.

With the construction as thus far described the depression of any one of the keys belonging to a series will raise the corresponding stop-bar E, and when subsequently the shaft J is rocked motion will be communicated therefrom through the connections described to rock forward the universal bar J⁵, thereby causing a forward movement of the rack-bar until further movement is arrested by the stop E. Thus the amount of movement imparted to the rack-bar is determined by the particular key which is depressed. In addition to the stop-bars E there is a stop E' for each series, which is in the form of a rock-arm pivoted upon a shaft E² and normally in the path of the corresponding rack-bar F. This stop, as will be hereinafter explained, permits sufficient movement of the rack-bar to cause the printing of a cipher, but not sufficient to make an addition upon the register-wheel II'. Whenever one of the stop-bars E is raised the stop E' will be lifted thereby out of the path of the rack-bar. For holding the stops E in elevated position when actuated by their corresponding keys a latch K is arranged adjacent to each series and is adapted to engage with a projecting lug or shoulder K at the side of each stop-bar. The arrangement is such that where one key of a series has been depressed and its stop-bar consequently locked in elevated position by the latch-bar

K the operation of a second key in the same series will cause the withdrawal of the latch-bar and release of the previously-actuated stop-bar, so that no two keys of one series can be locked in operative position at the same time if successively depressed.

In the successive operation of the machine for the addition of a series of items the register-wheels H' are actuated during the return movement of their corresponding rack-bars F , the amount of this return movement being first determined by the limit to the forward movement imposed by the stop-bars E . It is thus necessary to hold the pinions H out of engagement with the rack-bars during the forward movement of the latter and then to engage the same for actuation during the return movement. On the other hand, when a total is to be recorded it is necessary to reverse the engagement of the rack-bars with the pinions, so that the latter will be actuated during the forward movement of the racks. This is for the reason that the printing mechanism is actuated by the rack-bars, as previously stated, the particular numeral recorded being determined by the amount of forward movement of the rack-bar. Thus in the operations of registering and adding items each number recorded corresponds to the actuated key of the series to which it belongs; but in totalizing the numeral recorded must correspond to the numeral which is exhibited on the register-wheel, and this can only be accomplished by permitting a movement of the rack-bar equal to that required for turning the register-wheel from zero to the numeral exhibited thereby. It will therefore be understood that the engagement of the pinion with the rack-bar before the forward movement of the latter will cause the reverse rotation of the register-wheel, and by providing means for stopping said wheel at the zero-point the amount of movement permitted the rack-bar will correspond exactly to the number which was exhibited on the wheel.

To accomplish the results above described, mechanism must be provided whereby the item-adding operations will automatically engage the pinions with the racks between the completion of their forward movement and the beginning of the return movement. On the other hand, in totalizing, a reverse operation must be accomplished, whereby the pinions are engaged with the racks before the latter move forward. Furthermore, to permit of recording both clearing totals (by which the machine is set at zero ready for the beginning of a new series) and subtotals (which do not clear the machine) the totalizing mechanism must be capable of alternatively disengaging the pinions from the racks after their forward movement or maintaining them in engagement with said racks during both forward and return movement. In the latter case the register-wheels

after being first turned back to zero will be restored to the same position they occupied before the totalizing operation, and consequently items subsequently recorded will be added to those already in the machine. With the present invention these results are accomplished by providing a single key which controls both the recording of clearing totals and subtotals, the two operations being differentiated by releasing said key in one case before the completion of the operation and maintaining it depressed in the other case. The detailed construction of this mechanism is as follows: L are vertically-extending bars upon opposite sides of the machine, in the upper ends of which the shaft I is secured. The lower ends of these bars normally rest upon lugs L' , projecting from the frame, thereby holding the shaft I and the register wheels and pinions thereon in a position where said pinions are out of engagement with their racks. Adjacent to each bar L is a second vertically-extending bar L^2 , which at its upper end is pivotally connected to a lever or rock-arm L^3 , fulcrumed upon the frame at its opposite end and having an intermediate connection with the shaft I and bar L . The lower ends of the bars L^2 have a lost-motion connection with a swinging shaft M , which extends transversely of the machine and is secured in rock-arms M' , pivotally connected to the frame, being preferably sleeved upon a shaft M^2 , upon which the links G are fulcrumed. The lost motion between the rods L^2 and shaft M is provided by slotting said rods to engage the shaft, thereby permitting the shaft to lower during its swinging movement without directly drawing downward the rods, but in normal position—i. e., when the shaft I is raised and the shaft M is in its upper position the latter bears against the end of the slot M^3 , so that the rods L^2 form additional supports for the shaft I . Each of the bars L has pivotally connected thereto a link N , which is slotted at N' to engage with the shaft M , so as to permit a limited independent swinging of said shaft; but when the shaft has traveled to the end of the slot N' a further movement thereof causes the drawing upon the links N and the disengagement of the rods L from the supporting-lugs L' . O are links connecting the shaft M with crank-arms O' upon the main rock-shaft J , the arrangement being such that when the machine is operated as has been described the rocking of the shaft J will cause the swinging of the shaft M , and after the lost motion in the link M is taken up the bars L will be withdrawn from the supporting-lugs L' , permitting the shaft I to drop downward and engaging all of the pinions H with their corresponding racks F . The downward movement of the shaft I may be accomplished by gravity, but in addition thereto it is me-

chanically drawn down by springs L^5 connecting the rods L^2 and shaft M , which springs are tensioned as the latter travels to the lower end of the slots M^3 and continues to swing downward under the actuation of the links O .

The reverse rocking movement of the main shaft J will effect a lifting of the shaft I and a reengagement of the rods L with the supporting-lugs L' . This is caused by the upward swinging of the shaft M , which after the lost motion is taken up pushes upward the rods L^2 , rocking the levers L^3 and lifting the shaft I until the lower ends of the rods L are sufficiently raised to engage with the lugs L' . A spring L^4 serves to draw the rods L into engagement with said lugs. Thus a complete reciprocation of the rock-shaft J will effect the lowering of the shaft I near the end of the forward movement and the raising of said shaft near the end of the return movement, the interval between being sufficient for a complete return movement of the rack-bars F and the actuation of the respective pinions thereby during the item adding and recording operations. The reversal in the operation of these bars during totalizing is accomplished by the following mechanism: P is the totalizing-key, which is connected to a rock arm or lever P' , connected to a rock-shaft, preferably the shaft M^2 , upon which the rock-arms M' and the links G are sleeved. P^2 are rock-arms secured to the shaft M^2 and extending upward therefrom on opposite sides of the machine. P^3 are links connecting the arms P^2 to the bars L , but sufficient lost motion is permitted, as by the slot P^4 , so that said bars L may be moved laterally under the actuation of the links N without movement of the rock-arms P^2 . On the other hand, a rocking of said rock-arms P^2 under the actuation of the rock-arm P' when the key P is depressed will cause the lateral movement of the bars L to disengage the same from the supporting-lugs L' .

With the parts just described whenever the key P is first depressed and the rock-shaft J then actuated the bars L will be withdrawn from their supports, so that in the initial operation of the mechanism the shaft I will be lowered, and the timing of the parts is such that the pinions will be completely engaged with the racks before the latter travel forward. If a subtotal is to be recorded, the key P is held in its depressed position during the return movement also of the rock-shaft J , thus maintaining the engagement between the pinion and rack-bar until at the regular time the operation of the shaft M and bar L^2 will effect the disengagement, as in the item-recording operations. On the other hand, if a clearing total is to be recorded, disengagement of the pinions from the racks must be effected be-

fore the latter begin their return, this being accomplished by the following mechanism: Q is a rock-shaft, preferably the shaft upon which the links G' are independently fulcrumed, said shaft extending to opposite sides of the frame and having secured thereto at opposite ends the bell-crank levers Q' . One arm a of each of these levers extends to a point adjacent to the bar L and beneath a shoulder or roll b thereon. The opposite arm b of each bell-crank has connected thereto the pivotal bar Q^2 , which extends to a point adjacent to the rock-arm P^2 and above a projecting pin or lug Q^3 thereon. The bar L^2 is also provided with a projecting lug or pin Q^4 beneath the pivotal bar Q^2 , and in the normal position of parts said bar Q^2 is supported by the lugs Q^3 Q^4 , a spring Q^5 being preferably provided for drawing the bar downward. The lug Q^3 is provided with a shoulder d , and the bar Q^2 is provided with a notch e , these parts being so arranged that when the rock-arms P^2 are moved forward the pin Q^3 will be carried to a position with the shoulder d thereof in registration with the notch e . Engagement of the shoulder with the notch is, however, prevented so long as the bar L^2 remains in normal position, for the reason that the lug Q^4 prevents the dropping of the pivotal bar Q^2 . At the same time the registration of the shoulder d with the notch e , if maintained during the operation of the machine, will permit engagement of the said parts as soon as the bar L^2 is lowered, and this will occur upon the initial downward swinging of the shaft M . Thus a coupling between the rock-arms P^2 and the bell-crank levers Q' is effected, which when the key P is released and moves upward again will cause the rocking of said bell-cranks Q' , causing the arms a thereof to engage with the lugs b on the bars L and lift the latter, together with the shaft I and register wheels and pinions.

It will be understood that the difference between a subtotal and clearing total is thus dependent upon whether the key P is held down or released. In the former case there will be no movement of the rock-arms P^2 , and consequently the lifting of the shaft I will be delayed until the swinging shaft M is returned and lifts the bars L^2 , this occurring after the return of the rack-bars F . On the other hand, the release of the key before the return movement of the rack-bars will, through the mechanism described, lift the shaft I , thereby permitting the register-wheels to remain at the zero position, which clears the machine.

To prevent disorganization or incorrect operations of the machine, provision is made for controlling the operation of the key P , so that when depressed and after the initial operation of the rock-shaft J it cannot be released until the completion of the forward

rocking of said shaft. Again, at the completion of said forward rocking movement if the key P is released it cannot be depressed again until the completion of the return movement. To accomplish this, a segment S is secured to the rock-shaft J, said plate being provided with a guide-flange S', projecting from one side thereof. S² is a lug or roll secured to the lever P', connected to the key P and extending adjacent to the segment S. S² is a member pivoted to the segment S, which has a portion S⁴ complementary to the segmental guide S' at one end thereof, and S³ is a second pivoted member at the opposite end of the guide S' and having a portion complementary thereto. The arrangement is such that in the normal position of parts the roll S² bears against the pivoted member S³, and upon a depression of the key P this roll is permitted to pass beneath the guide S'. An immediate return movement of the key is, however, prevented by the hooking of the portion S⁴ of the member S² over the roll S³, this movement being caused by a spring S⁶. Thus the key P is locked down until the shaft J completes its forward rocking movement, at the end of which the common roll S² bears against the member S³, rocking it sufficiently to provide a clear path for the upward movement of the roll. Where the key P is held depressed during the return movement of the shaft J, as for a subtotal, the key is finally released by the operation of a pivoted member S⁷. This is arranged in the path of the roll S² when the key P is depressed, and during the forward rocking movement of the shaft J said member S⁷ turns sufficiently to permit the passing of the roll. During the return movement the member S⁷ is also rocked by the roll, and in so doing it bears against the pivoted member S³, actuating the same against the tension of the spring S⁶, so as to provide a clear passage for the upward movement of the roll. The pivoted member S⁵ is further provided with an inwardly-projecting lug S⁸, so arranged as to be in the path of the roll S² during the forward rocking movement of the shaft J, causing the rocking of the member S⁵ until the roll is released from the flange S' and the key P is permitted to rise. If, then, an attempt is made to again depress the key, it is prevented by engagement of the roll with said lug S⁸, the space between said lug S⁸ and the end of the member S⁵ being less than the diameter of the roll, so that the roll cannot again be sufficiently depressed to pass beneath the guide-flange S'. The operation of the key P is made positive, both in its downward and its return movement, by suitably camming the ends of the guide S'. These cam portions are so shaped that after the key is depressed a portion of its stroke the cam will engage with the roll S² and force the key downward the remaining distance. In the same manner the

release of the key at the end of the forward rocking movement of the shaft J will engage the roll S² with the incline S⁹ of the cam, so that the key is positively pressed upward to its normal position. It is therefore unnecessary to provide a return-spring for the key P of sufficient tension to actuate the mechanism operated by said key when released. All that is needed is a spring, such as P⁵, of light tension for initially returning the key, and the subsequent movement is positively actuated by the rocking of the shaft J.

The lifting of the shaft I and connected parts through the medium of the cam S⁹ and roll S² requires the application of a considerable force not needed during the item-recording operations. Instead, therefore, of providing a returning spring for the shaft J of sufficient tension to supply this additional force an auxiliary spring R is employed, which is only placed under tension when the total-key is depressed. This spring R, as illustrated, is connected at one end to the frame and at its opposite end to a bell-crank lever R', fulcrumed upon the frame. One arm of this bell-crank is provided with an extension member R², which has a limited oscillatory movement in relation to the bell-crank formed by the pin R³ engaging a slot R⁴, while a spring R⁵ holds the pin R⁴ normally against one end of said slot.

R⁶ is a lug or roll secured to the crank O', which in the swinging of said crank travels in proximity to the extension-arm R² of the bell-crank lever R'; but said extension-arm is normally in a position to clear the path of said roll.

R⁷ is a finger projecting from the extension R² into the path of a pin R⁸ upon the totalizing-key P and so arranged that upon the depression of said key the extension R² will be moved into the path of the roll R⁶. Thus when said key is depressed and the shaft J is rocked the roll R⁶ will actuate the bell-crank lever R', placing the spring R under tension. Upon the return movement of the rock-shaft J the force stored in this spring will be exerted and will supply the additional power required to cause the cam S⁹ to force upward the roll S² and operate the connected mechanism for lifting the shaft I.

For convenience in correcting errors in the operation of the keys machines of this character have heretofore been provided with error-correcting keys capable of releasing the latches K', which hold the stop-bars E in raised position. In the present construction I have provided connections whereby the same error-correcting key may be employed for releasing the total-key where the latter has been accidentally depressed and before the operation of the crank-shaft J. As shown, T is the error-correcting key, which is connected to operate a rock-shaft T', having a rock-arm T² for actuating a rock-arm T³ on

a rock-shaft T^4 . This rock-shaft T^4 extends across the machine adjacent to the several latches K' for the different series of stops E , and fingers T^5 , projecting from the shaft T^4 , are arranged to operate said latches when the shaft is locked. Thus the actuation of the correcting-key T will simultaneously release all of the latches and the stop-bars held in raised position thereby.

For releasing the total-key P a link T^6 is connected at one end to the rock-arm T^2 and at its opposite end to a lever T^7 , which is pivoted to the frame. The free end of this lever has a roll T^8 , so arranged in relation to the pivoted member S^3 that during the depression of the correcting-key T the rocking of the lever T^7 will cause the roll T^8 to bear against said member S^3 , moving the latter sufficiently to release it from engagement with the roll S^2 , and thereby releasing the total-key.

To prevent an accidental operation of the machine when both the totalizing-key and some of the other keys are depressed, provision is made whereby the operation of said totalizing-key will release all the other keys. For this purpose a bar U is slidably secured to the frame, as by pins U' , engaging slotted bearings in the bar. U^2 is a pin projecting from this bar and engaging a slotted bearing in one of the rock-arms P^2 . U^3 is an arm projecting downward from the bar U , and U^4 is a pin projecting into the path of said arm and attached to a rock-arm U^5 on the rock-shaft T^4 . Through the medium of the parts just described whenever the key P is depressed the bar U will be moved longitudinally by the pin U^2 and the arm U^3 will actuate the rock-arm U^5 and rock-shaft T^4 , so as to effect releasing of all the latches in the same manner as where actuated by the correcting-key T .

In the operation of the totalizing mechanism as previously described it has been stated that the various register-wheels are turned backward and arrested at the zero-point. For this purpose a universal stop-bar V is pivotally secured in the frame to be capable of a rocking movement, and in one position of this bar it projects into the path of fingers V' on each of the register-wheels. The normal position of the bar V is such as to lock said fingers, and it is only upon the operation of the totalizing mechanism that it engages said fingers. This operation is effected by providing a rock-arm V^2 on the bar V , which has a pin V^3 engaging a slotted bearing V^4 on the slidable bar U . As this bar U is actuated by the totalizing-key, it will be understood that the universal stop-bar V will be simultaneously operated through the medium of the parts just described.

To permit the rack-bars F to move forward during the totalizing operation, the series of stops E' must be raised to clear the ends of

said bars. For this purpose a rock-arm W is pivoted to the frame and provided at its free end with a roll W' , engaging a cam-slot W^2 in the slidable bar U , so that during the movement of said bar the arm W will be actuated.

W^3 is a universal bar connected to the rock-arm W and extending beneath all of the series stops E' , the arrangement being such that the said stops are all lifted by the depression of the totalizing-key.

What I claim as my invention is—

1. In an adding-machine the combination with a reciprocatory rack-bar, a register-wheel, an associated pinion in the plane of said rack and a vertically-adjustable shaft upon which said pinion and register-wheel are mounted, of means for automatically engaging and disengaging said pinion and rack-bar comprising a detent for holding said shaft in its raised position, means for disengaging said detent between the forward and return movements of said rack, and means for lifting said shaft and reengaging said detent after the completion of the return movement; an independent optionally-operable means controlling the engagement and disengagement of said rack and pinion comprising a single operating-lever, a connection to said lever for releasing said detent, a lever for raising the shaft to reengage said detent, and a connection between said first and last mentioned lever for operating the latter upon the return movement of the former.

2. In an adding-machine the combination with a reciprocatory rack-bar, a register-wheel, an associated pinion in the plane of said rack-bar and a vertically-movable shaft on which said pinion and wheel are mounted, of automatically-operating mechanism for engaging and disengaging said rack and pinion comprising timed mechanism for raising and lowering said shaft respectively before and after the reciprocation of said rack-bar, a detent for holding said shaft from lowering and means for automatically disengaging said detent between the forward and return movements of said rack; a single optionally-operable lever for independently controlling engagement and disengagement of said rack and pinion, a connection to said lever for disengaging said detent, a lever for lifting said shaft to reengage said detent, and means operating upon the movement of said first-mentioned lever in one direction and the lowering of said shaft, for effecting a coupling between said first and last mentioned levers, whereby the latter may be operated by the return movement of the former, and means for disengaging said coupling upon the raising of said shaft.

3. In an adding-machine the combination with a reciprocatory rack-bar and a register-wheel and pinion, of a vertically-movable shaft on which said wheel and pinion are mounted, a vertical rod for supporting said

shaft in raised position, a bearing upon which the lower end of said rod rests, means for disengaging said rod from its bearing to permit the lowering of said shaft, timed to operate between the forward and return movements of said rack-bar, means for lifting said shaft and reengaging said rod with said bearing after the completion of the movement of said rack, an optionally-operable lever, a connection between said lever and rod, whereby the latter is disengaged from its supporting-bearing upon the movement of the former in one direction, a lever for lifting said rod to permit reengagement of the same with said supporting-bearing and a link or pawl extending between said first and last mentioned levers for automatically coupling the same upon the said movement of said first-mentioned lever in one direction and the lowering of said shaft, whereby the return movement of said lever will effect the raising of said shaft.

4. In an adding-machine the combination with a reciprocatory rack-bar and a pinion, of timed automatically-operating mechanism for engaging and disengaging said rack and pinion, an optionally-operable lever, a connection whereby the movement of said lever in one direction will advance the time of engagement of said rack and pinion, automatically-operating means for temporarily preventing the return movement of said lever, a lever for independently disengaging said pinion and a normally disconnected coupling between said first and last mentioned levers, adapted to be engaged during the interval in which said first-mentioned lever is locked, whereby the return movement of said lever will effect the disengagement of said rack and pinion.

5. In an adding-machine the combination with a reciprocatory rack and a register-pinion, of timed automatically-operating mechanism for engaging and disengaging said rack and pinion, an independent optionally-operable means for effecting said engagement and disengagement, comprising a lever which when moved in one direction advances the time of engagement and when moved in the opposite direction advances the time of disengagement, automatic controlling means whereby said lever can only be actuated in one direction in advance of the operation of said automatic mechanism, whereby the return movement is timed.

6. In an adding-machine the combination with item-registering keys and a totalizing-key, of means for automatically locking said keys when depressed and means whereby the operation of said totalizing-key will release

previously-locked item-registering keys and the operation of the latter will release the former.

7. In an adding-machine the combination with item-registering keys and a totalizing-key, of means for locking said keys when depressed and a correcting-key operating to release either the item-registering keys or said totalizing-key.

8. In an adding-machine the combination with a reciprocatory rack-bar and a register-pinion, of timed automatic mechanism for engaging and disengaging said rack and pinion, an optionally-operable lever for independently effecting said engagement and disengagement upon movement thereof in opposite directions and a cam operating after the initial movement of said lever for supplying the power to complete the movement thereof and actuate the mechanism operated thereby.

9. In an adding-machine the combination with a series of reciprocatory racks and a series of cooperating pinions, of a vertically-movable shaft upon which said pinions are mounted, automatically-operating timed mechanism for raising and lowering said shaft to engage and disengage said racks and pinions, an optionally-operable lever for independently effecting said engagement and disengagement, the former upon its operation in one direction and the latter upon the return movement, and power-actuating means operating after the initial return movement of said lever for furnishing the power to complete the movement thereof.

10. In an adding-machine the combination with a series of reciprocatory rack-bars and a series of cooperating pinions, of a vertically-movable shaft upon which said pinions are mounted, reciprocatory automatic mechanism for raising and lowering said shaft to effect the engagement and disengagement of said racks and pinions respectively upon the forward and return movements, an optionally-operable lever for independently raising said shaft to effect the disengagement of said pinions, a cam for mechanically actuating said lever and means for storing power upon the forward movement of said automatic reciprocatory mechanism for operating said cam and lever to effect the raising of said shaft.

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

CHARLES N. McFARLAND.

Witnesses:

T. F. HEFFERNAN,
W. A. ROBERTS.