(No Model.) 2 Sheets—Sheet 1.

W. F. GATEWOOD.

ADDING MACHINE.

No. 370,777. Patented Oct. 4, 1887.

Fig. 1.

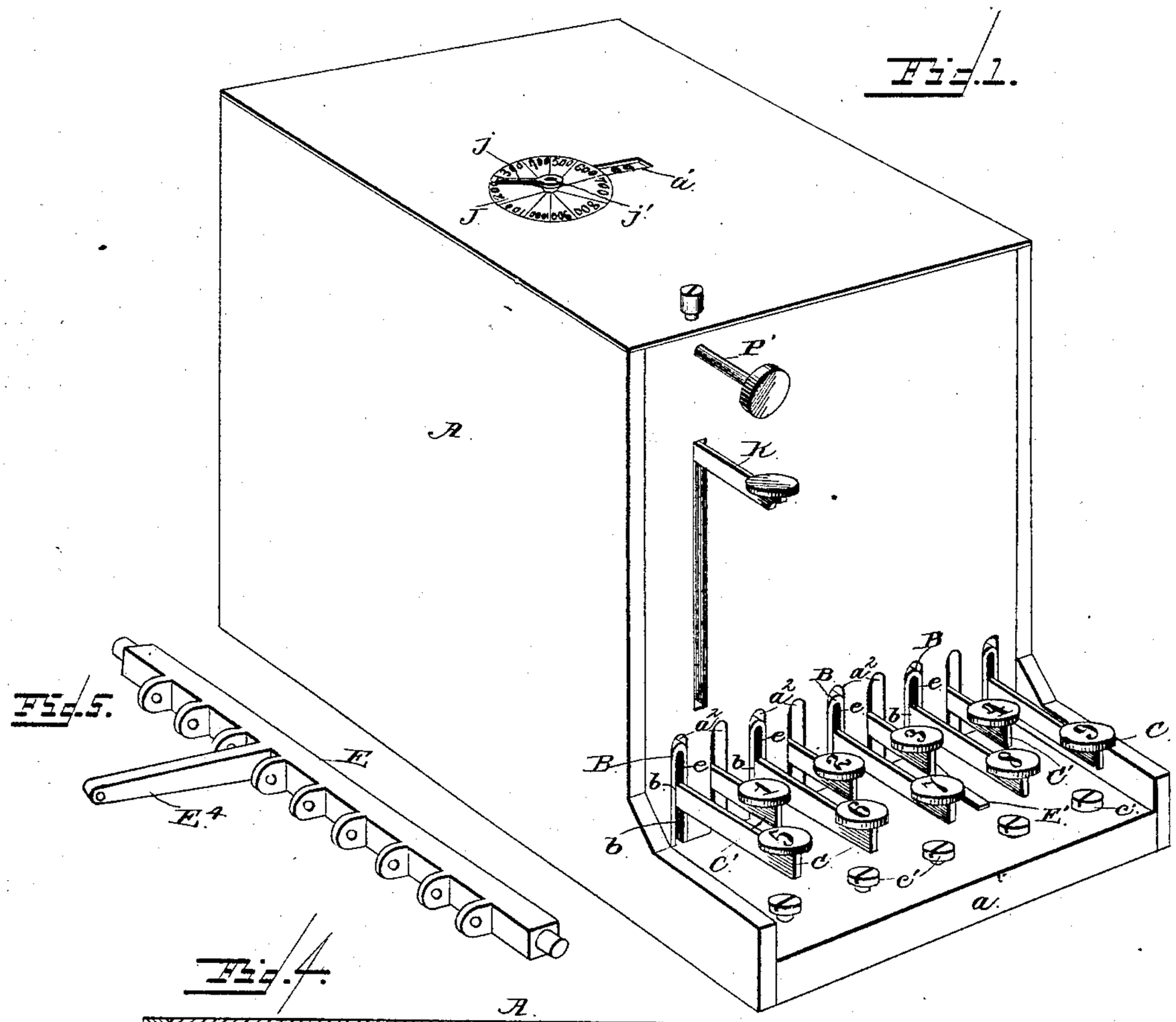
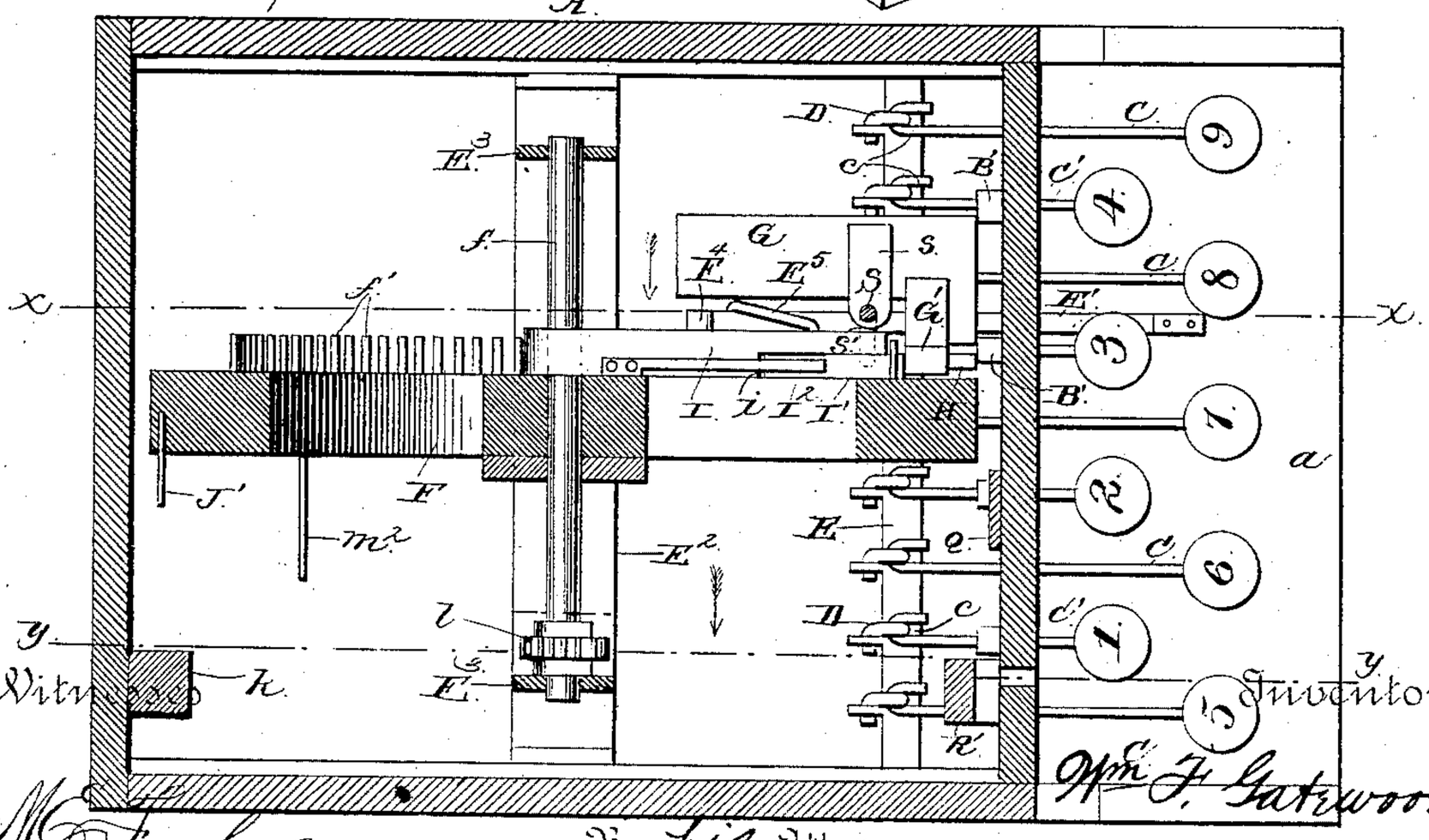


Fig. 5.

Fig. 4.



Witnesses

Inventor.

Wm F. Gatewood

By his Attorneys.

M. Fowler

E. G. Siggers

C. A. Snow & Co.

(No Model.) 2 Sheets—Sheet 2.

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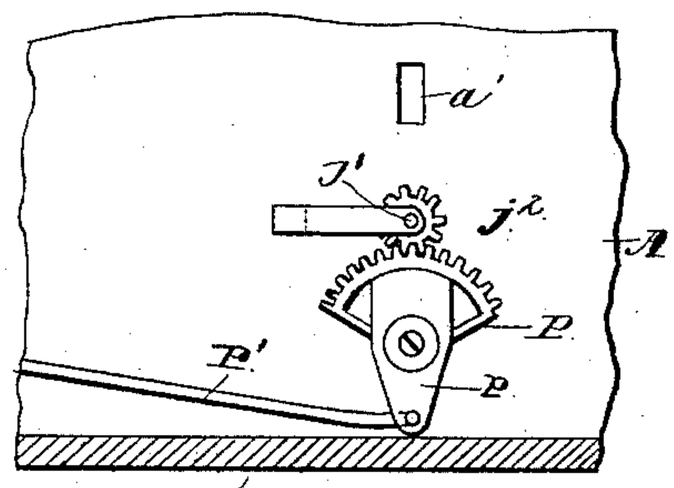

Fig. 6.

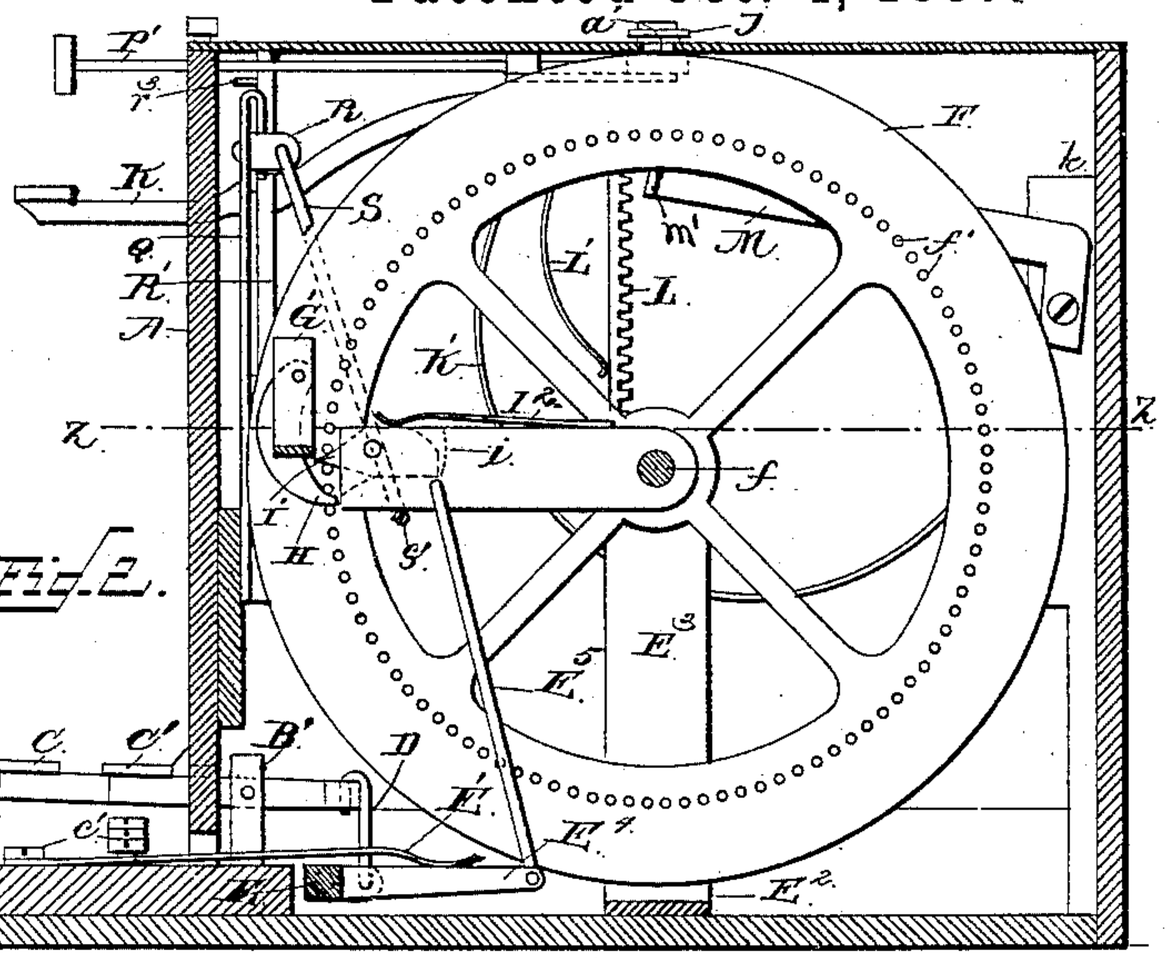

Fig. 2.

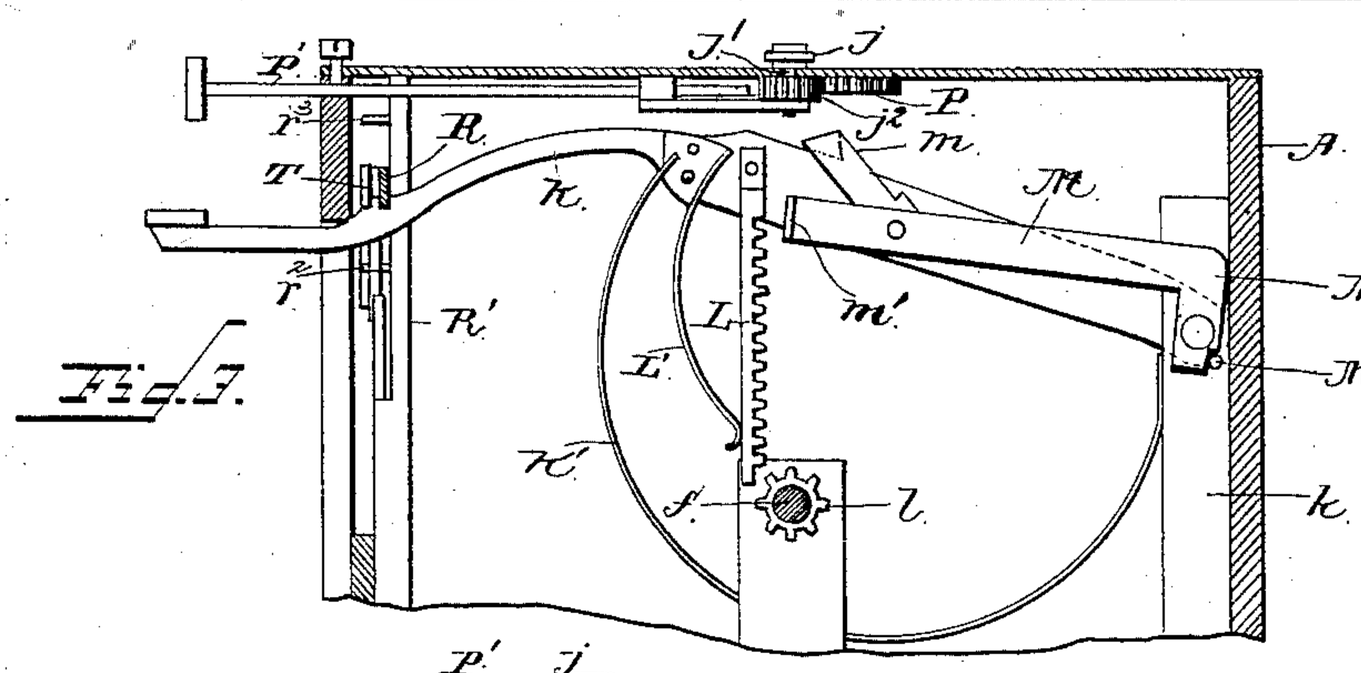

Fig. 3.

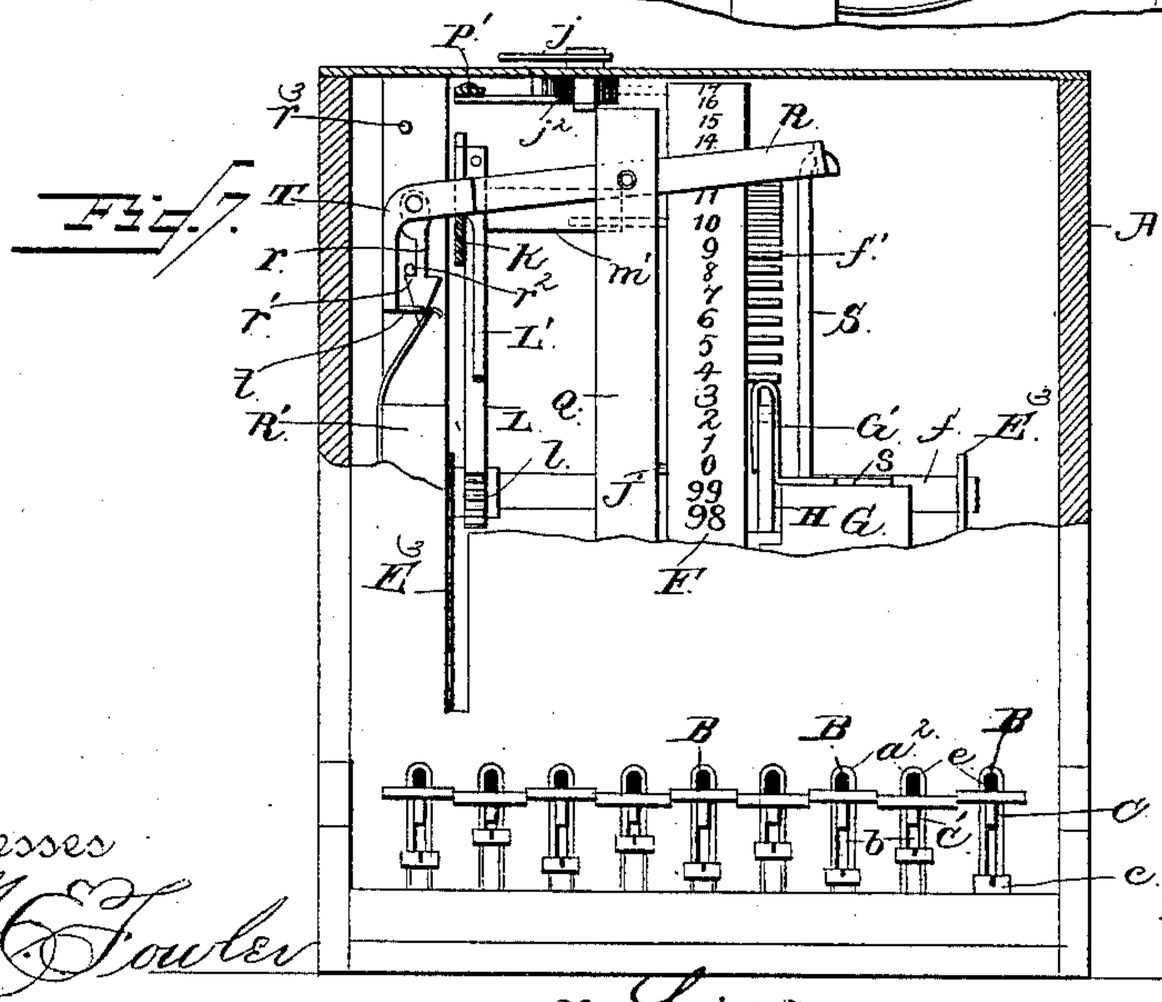

Fig. 7.

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UNITED STATES PATENT OFFICE.

WILLIAM F. GATEWOOD, OF HARVARD, NEBRASKA, ASSIGNOR OF ONE-HALF TO CYRENEUS ROCKHILL, OF SAME PLACE.

ADDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 370,777, dated October 4, 1887.

Application filed April 7, 1887. Serial No. 234,046. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. GATEWOOD, a citizen of the United States, residing at Harvard, in the county of Clay and State of Nebraska, have invented new and useful Improvements in Adding-Machines, of which the following is a specification.

This invention relates to improvements in adding-machines; and it consists of the peculiar combination of devices and novel construction and arrangement of parts, as will be hereinafter fully described, and pointed out in the claims.

In the accompanying drawings, which illustrate an adding-machine embodying my present improvements, Figure 1 is a perspective view of the machine. Fig. 2 is a vertical sectional view taken on the line *x x* of Fig. 4, looking in the direction of the arrow. Fig. 3 is a like sectional view on the line *y y* of Fig. 4, looking in the direction of the arrow, this view being taken on the opposite side of the rotating index-wheel from the line where the sectional view, Fig. 2, is taken. Fig. 4 is a horizontal sectional view on the line *z z* of Fig. 2. Fig. 5 is a detail view of the rock-shaft to be actuated by the keys. Fig. 6 is a detached detail view. Fig. 7 is a front elevation, partly in vertical section.

Referring to the drawings, in which like letters of reference indicate corresponding parts in all the figures, A designates the inclosing-case of an adding-machine embodying my invention, which case is preferably made of the form shown, the bottom board extending forwardly in a horizontal ledge or extension, *a*. The top of the case is provided at or near its middle with a slot or opening, *a'*, through which the numerals on the periphery of the rotary index-wheel can be readily ascertained, and in front the case is provided with a series of vertical slots, a^2, through which are passed the operating keys or levers which actuate the rock-shaft. In every alternate slot a^2 is placed a vertical standard, B, and in rear of the remaining slots is fixed a series of like standards, B', which are thus arranged out of line with the standards B, and are wholly inclosed within the case A. Each of these standards B B' is suitably fixed or secured to the base of the inclosing-case, and they are each provided with a vertical central slot, *b*, in which is fitted one of the series of operating keys or levers C C'.

There are two series of keys or levers provided, which, for the sake of convenience, I will letter C C', the series C being longer than the series C'. There are four of these short keys or levers C' provided, which I number from 1 to 4, inclusive, and I provide five of the longer keys C, which are numbered from 5 to 9, inclusive. If preferred, however, another key may be added to the series C', and the relative numbers of the longer keys be changed from 5 to 10, as is obvious. The short keys are arranged alternately between the longer keys, and the short keys are fitted in the slots of the standards B', while the longer keys are fitted in the slots of the standards B. Each of the series of keys C C' is pivoted at an intermediate point of its length in its proper standard, and the inner end of each key has a slot or opening, *c*, formed therein, through which is passed the headed or hooked upper end of a vertical connecting-rod, D, the lower end of each of said connecting-rods being pivotally connected to a horizontal rock-shaft, E, which is arranged transversely across the front of the case, beneath the inner ends of the keys or levers. This rock-shaft is journaled in suitable bearings provided therefor in the case, so as to turn or oscillate axially when any one of the keys or levers is depressed, and when one of the keys is depressed to turn the rock-shaft the vertical rods D of the other keys which remain untouched move freely through the slots or openings in the inner ends of the levers, so that only the key which is depressed will turn or operate the shaft. The shaft is normally held in a horizontal position with the keys in an elevated position by means of a spring, E', of either the coiled or flat class. The movement of the keys or levers is regulated or controlled by means of suitable adjusting-screws, *c'*, which are fitted in the horizontal ledge or extension *a* on the front side of the case, one of said regulating-screws being provided for each key and arranged on the base in the path of the same. The regulating-screws are turned or adjusted to per-

mit the levers to have movements or strokes of varying lengths, and thus turn or oscillate the rock-shaft different distances, which shaft thereby controls the length of movement of the feeding-pawl, as will presently appear. In the upper terminal end of the vertical slot in each standard B B′ is placed a cushion, *e*, of elastic or resilient material, which serves to limit and cushion the upward movement of the lever on its retrograde movement, as is obvious.

Within the case A of the machine I provide a vertical fixed supporting-frame, E^2, which has the parallel standards E^3, and in the upper ends of these standards are journaled, free to rotate, the extremities of a horizontal supporting-shaft, *f*, on the middle of which is affixed or secured, and rotating therewith, an index-wheel, F, of large diameter. This wheel is provided with a solid periphery and the radial spokes for lightness, and through the central hub of the wheel is passed the horizontal shaft. This wheel is provided on its periphery with numerals from 0 to 99, inclusive, which are suitably stamped, embossed, or otherwise indelibly inscribed, and the central slot, *a′*, of the case is arranged immediately over this index-wheel, so that the numerals thereon can be readily seen through the slot. The index-wheel is further provided with a series of teeth or pins, *f′*, which correspond in number to the numerals on the periphery of the wheel. These teeth or pins *f′* project laterally from one side of the periphery of the wheel, for a purpose presently described.

A vertical standard, G, is arranged in front of the frame E^2 and to one side of the rotating index-wheel F, and to the inner edge of this standard nearest to the index-wheel I affix a vertical bracket, G′, which is arranged in line with and to one side of the projecting teeth or pins *f′* of the index-wheel. In this vertical bracket is pivoted a gravity-pawl, H, which is made heavy at its lower free end, so that the nib or point thereof will be normally swung or thrown rearward of its pivot and into the path of the teeth of pins *f′* on the index-wheel, to thereby prevent retrograde movement of the said wheel.

A swinging arm, I, is fitted on the horizontal supporting-shaft *f*, on one side of the index-wheel thereon, and this arm is free to swing or turn on the shaft independently of the rotary motion of said shaft with the index-wheel F. The free end of this arm is recessed, as at *i*, and in this recess is fitted a feeding-pawl, I′, which is pivoted at its inner end and is free at its outer end, so as to take into the teeth or pins of the index-wheel. This swinging arm is normally arranged in approximately a horizontal position, with the free end of the feeding-pawl in close proximity to the retaining-pawl H, and said end of the arm is thus normally arranged above the horizontal rock-shaft, as will be readily understood. The free end of the feeding-pawl is normally held or pressed between two adjoining teeth or pins *f′* on the index-wheel when the pawl is at rest, by means of a spring, I^2, which is secured at one end to the swinging arm and rests at its free end upon the pawl. The swinging arm I is actuated by the rock-shaft, which is connected to the arm through the medium of a rocking arm, E^4, which projects rearwardly from the shaft, and a connecting-rod, E^5, which is pivoted at the inner end of the rocking arm and to the swinging arm I at a point in rear of the pawl I′.

It will be readily understood that when one of the keys C or C′ is depressed by the pressure of one of the fingers of the operator's hand thereon, the rock-shaft will be elevated against the tension of the return-spring and the rocking arm E^4, which is fixed to the shaft, will likewise be elevated to force the connecting-rod E^5 upwardly and thereby raise the swinging arm I. With the upward movement of the swinging arm I the feeding-pawl I′ will be withdrawn from the teeth or pins *f′* of the index-wheel, and when the pressure on the key is released the spring connected with the rock-shaft E will return the latter to its normal position and thereby draw the arm I downwardly, by which act the feeding-pawl will move or feed the index-wheel a distance equal to the distance which the pawl has been elevated. Each key being capable of different lengths of movement of stroke will raise the arm and feeding-pawl past a number of teeth or pins *f′* on the index-wheel corresponding to the numeral which the key represents. Thus when the key 4 is depressed, it will turn the rock-shaft to such an extent as to raise the feeding-pawl past four of the teeth or pins *f′*. When the key 8 is depressed, it will raise the feeding-pawl past eight of the teeth or pins *f′*, and so on, as will be readily understood. When one of the keys or levers is depressed, the pawl I′ is elevated past a number of pins or teeth *f′* corresponding to the numeral on the key, and when the pressure thereon is released the return-spring of the rock-shaft depresses the feeding-pawl, which thereby rotates the index-wheel a distance sufficient to expose the numeral on the periphery of the wheel below the observation-slot *a′*, which numeral thus exposed corresponds to the number of the key depressed. Thus when in the process of addition the lever 2 is depressed, the wheel is fed to bring the numeral 2 beneath the observation-slot *a′*, the lever 5 is depressed, the index-wheel is moved to expose the numeral 7 below the observation-slot *a′*, and so on.

The top of the inclosing-case A is provided with a supplemental dial, J, on which are indorsed or marked the numerals from 100 to 1,000, and over this dial traverses an index or hand, *j*, which is carried by a vertical shaft, *j′*, that passes through the top of the case A and has a spur gear-pinion, j^2, rigidly affixed to the lower end thereof. This gear-pinion is arranged above and to one side of the rotating index-wheel F, and it depends from the top of

the case in the path of a fixed pin or projection, J′, on one side of the index-wheel. This pin or projection J′ is affixed to the index-wheel opposite to the zero (0) character thereon, and it is adapted to strike one of the teeth on the spur gear-pinion j^2 each time the wheel F makes one complete rotation, to thereby turn the shaft j' and the index or pointer j to indicate a hundred at each complete revolution of the index-wheel, as is obvious.

I will now proceed to describe my mechanism for returning the index-wheel to its normal position after one column of figures has been added and to begin the addition of another column of figures.

I employ a horizontal lever, K, which is arranged in a plane on the opposite side of the index-wheel from the swinging arm I. This lever extends through the case A and has its rear end pivoted in a vertical post or standard, k, which is fixed in the case A. To this lever K is connected a feeding-rack, L, which is arranged in a vertical position within the case and is pivoted at its upper end to the lever at an intermediate point of the length of the latter. The feeding-rack L is thus carried by and depends from the pivoted operating-lever, and it is adapted to engage with a spur gear-pinion, l, which is secured to one of the ends of the horizontal shaft f, which carries or supports the index-wheel. This pivoted lever K is normally held in an elevated position for instant operation by a spring, K′, and the lower or free end of the feeding-rack L is thus normally elevated out of contact with the spur gear-pinion, so that the latter and the shaft f can rotate freely with the index-wheel F without hinderance from the feeding-rack. This feeding-rack is held in its proper vertical position to engage with the spur gear-pinion l on the downward stroke of the pivoted lever K by means of a spring, L′, which is fixed at one end to the lever K and bears against the feeding-pawl at or near its free end, the tension of this spring L′ being sufficient to hold the rack in its proper position while suspended, and to prevent it from moving forwardly and being drawn out of engagement with the teeth of the pinion on the downward movement of the said rack.

M designates a stop arm, which is arranged at one side of the operating-lever K and is pivoted at its rear end on the vertical fixed standard k. This stop-arm is provided on one side with a laterally-projecting tooth or spur, m, which normally rests upon the upper side of the operating-lever K, (see dotted lines in Fig. 3,) and from the opposite side of the stop-arm projects a stop tooth or spur, m', which is arranged in the path of the limiting-pin m^2, which is rigidly affixed to the index-wheel F at a point below and in line with the operating-pin J′ thereof, and also in line with the character 0. The rear end of this stop-arm M is provided with an elbow, M′, which is preferably formed integral with the arm, and this arm is adapted to impinge or bear against a fixed pin, M^3, on the post k when the operating-lever K is depressed to withdraw its support from the prong or tooth m', and thereby allow the free end of the stop-arm to drop or fall slightly and thus adjust its tooth m' in the path of the pin m^2, the said elbow serving to limit the downward movement of the free end of the stop-arm M, so that it will be rigidly supported to prevent the index-wheel from traveling too far around.

The operation of this part of my invention is as follows: After the necessary calculations have been made to add one column, by manipulating the operating keys or levers C C′ in the manner hereinbefore described, and it is desired to return the index-wheel F to its normal position, so that the 0 character aligns with the observation-slot a', and thus adapt the machine to add a new column of figures, the key 1 is depressed to withdraw the feeding-pawl from engagement with the teeth or pins f' of the index-wheel and thus permit the latter to rotate in one direction freely, the reverse movement of the index-wheel being prevented by the detaining-pawl H. The free end of the operating-lever K is now depressed to throw the feeding-rack into engagement with the spur gear-pinion on the shaft f, which thereby rotates the latter until the numeral 99 aligns with the slot a', when the rotary movement of the index-wheel will be limited in the following manner: Simultaneously with the downward movement of the pivoted lever K, the free end of the stop-arm M is lowered by its own gravity until the elbow at the pivoted end of the stop-arm comes in contact with the fixed pin M^3, which thus supports the stop-arm in position and so that its tooth or spur m' is in the path of the pin m^2 on the index-wheel F, said pin striking against the tooth or spur m' of the stop-arm when the numeral 99 registers with the observation-slot a', and thereby arrests the motion of the index-wheel. The pressure on the lever or key 1 is now released to thereby feed the index-wheel one step, which brings the character 0 in line with the observation-slot, and the lever K is released and elevated by its spring. This elevation of the feeding-rack and lever K does not affect the position of the index-wheel, because it is held against reverse movement by the detaining-pawl H engaging with the pins or teeth f'.

In order to return the hundreds index or pointer j to 0, I provide a pivoted toothed segment, P, which is supported on the inner side of the top of the case A and engages with the spur gear-pinion on the shaft j', and this segment has an extended arm, p, to which is pivoted the inner end of a push-rod, P′, which extends through a suitable opening or slot in the front wall of the case. By moving the push-rod P′ in the proper direction the segment will be turned on its pivot to rotate the pinion and thus turn the shaft or arbor until the index or pointer registers with the character 0.

Q designates a fixed standard, which is arranged in the front part of the inclosing-case and to one side of the rotating index-wheel F, and on this standard is pivoted a horizontal lever-arm, R, said arm being pivoted centrally to the said standard. One end of the lever-arm extends over and is arranged in the path of the free end of the pivoted lever K, and to this end of the lever-arm is pivoted a latch, *r*, which has a tooth, *r'*, on its lower end, which is adapted to take under the fixed stop-pin r^2 on the front side of another standard, R', which is fixed in the lower end of the case. This lever-arm rests upon and is moved vertically with the pivoted lever K, so that its outer end, to which the latch is connected, is normally elevated, and the inner end of the lever-arm has the upper end of an operating-rod, S, pivotally connected thereto, the lower end of the said rod S being passed through a suitable guide, *s*, on the upper end of the standard G, and having an elbow, *s'*, which is arranged beneath and in the path of the swinging arm I. When the outer end of the lever K is depressed, the outer end of the arm R moves therewith, so that the latch *r* will ride over the pin and hold the lever-arm in this position until the lever K is raised by its return-spring, and simultaneously with the downward movement of the outer end of the lever-arm R the inner end of the latter is raised to draw upon the operating-rod S, and elevate the latter so that its elbow *s'* will take against the lower end of the swinging arm I to raise the latter, and thus withdraw its pawl I' from engagement with the teeth or pins *f'* of the index-wheel. The outer end of the lever-arm R works between the fixed pin r^3 and the pin r^2, so as to be limited thereby, and to the said end of the lever-arm is pivoted an elbow-lever, T, one arm of which rides or impinges against the lever K, while the other arm has a nib, *t*, which takes beneath the pin r^2 when the lever-arm R is elevated. By means of the lever-arm being connected to and operated by the lever K, and having the operating-rod S to raise or elevate the feeding-pawl from the teeth or pins *f'* of the index-wheel simultaneously with the downward movement of the lever K, I may dispense with the operation of depressing the key or lever 1, in order to return the index-wheel to its normal position.

The operation of my invention will be readily understood from the foregoing description, taken in connection with the drawings, by those skilled in the art to which my invention relates.

I would state that while I deem the mechanisms herein shown and described as best adapted for carrying my invention into effect, still I do not wish to confine myself to the precise details of construction, but hold myself at liberty to make such changes and alterations as fairly fall within the scope of my invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an adding-machine, the combination, with an inclosing-case having an inspection-opening in its top, of a shaft, a rotating index-wheel mounted on said shaft, a series of pins extending from the said wheel, a plate hung loosely on said shaft and carrying a spring-pawl to engage said pins, a rock-shaft parallel with the wheel-shaft and journaled at each end in the case and having a single connection with the pawl-plate, and a series of keys independently connected to said rock-shaft and extending through the case, as set forth.

2. In an adding-machine, the combination of the inclosing-case, shaft *f*, having the wheel F and a pawl-plate mounted thereon, as described, pins *f'*, projecting from the wheel F, spring-pawl I', engaging said pins, rock-shaft E, rod E^5, connecting said shaft to the pawl-plate, a series of keys independently connected to the rock-shaft, and a series of set-screws arranged under the outer ends of the keys to limit the play of the same, substantially as set forth.

3. In an adding-machine, the combination of the inclosing-case having a series of slots in its front, a shaft, *f*, having a wheel, F, and a pawl-plate mounted thereon, as described, pins *f'* on the wheel F, a spring-pawl, I', a rock-shaft, E, connected with the pawl-plate, slotted standards B B', arranged coincidently with the slots in the front of the case, and a series of keys or levers pivoted in said standards and connected to the rock-shaft, substantially as specified.

4. In an adding-machine, the combination, with an inclosing-case, of a shaft, *f*, having the wheel F and a pawl-plate mounted thereon, as described, pins *f'*, a spring-pawl, I', operating-keys and connections with the pawl-plate, a pinion rotating with said wheel, a rack and operating-rod, and a spring for throwing said rack out of engagement with the pinion, substantially as set forth.

5. In an adding-machine, the combination, with an inclosing-case, of a shaft, *f*, having the wheel F and a pawl-plate mounted thereon, as described, pins *f'*, a spring-pawl, I', operating-keys and their connections with the pawl-plate, a pinion rotating with said wheel, a lever, K, and a rack hung thereto, a spring for normally throwing said rack out of engagement with said pinion, and a spring for throwing said rack toward the pinion, substantially as set forth.

6. In an adding-machine, the combination of a shaft carrying an index-wheel provided with a stop-pin, a lever for rotating the shaft and wheel, and a stop-arm controlled by the lever and normally held thereby out of the path of the stop-pin on the index-wheel, said stop-arm being automatically thrown into the

path of the pin on the wheel when the lever is operated to rotate the wheel, as and for the purpose described.

7. In an adding-machine, the combination of a rotating wheel having a stop-pin, a lever for rotating the wheel, and a stop-arm controlled by the lever and thrown automatically into the path of the stop-pin when the lever is operated, as and for the purpose described.

8. In an adding-machine, the combination of a rotating wheel having a stop-pin, an operating-lever for rotating the wheel in one direction, and a pivoted stop-arm supported by the lever out of the path of the stop-pin when the lever is at rest, said arm being thrown automatically into the path of the stop-pin when the lever is depressed, as and for the purpose described.

9. In an adding-machine, the combination of a rotating wheel, a lever, K, for moving the wheel in one direction, a pivoted stop-arm having the elbow at one end and the laterally-projecting tooth or spurs at its free end, one of which rests on and is supported by the lever to hold the other tooth or spur normally out of the path of a stop-pin on the index-wheel, and a fixed pin in rear of the elbow to arrest the downward movement of the free end of the stop-arm when the lever is depressed, as and for the purpose described.

10. In an adding-machine, the combination of a rotating index-wheel having the operating-pin projecting therefrom, a shaft carrying a pointer or index at one end and a spur gear-pinion at its other, which is arranged in the path of the operating-pin on the index-wheel, an operating-segment adapted to be thrown into gear with the pinion, and a push-rod connected to the segment, as and for the purpose described.

11. The combination, in an adding-machine, of a rotating index-wheel having the teeth, a feeding-pawl, an operating-lever, K, for rotating the index-wheel in one direction, a lever-arm controlled by the operating-lever, and an operating-rod connected to the lever-arm for raising the feeding-pawl from engagement with the teeth of the index-wheel when the operating-lever is depressed, as and for the purpose described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

WILLIAM F. GATEWOOD.

Witnesses:
G. S. BABCOCK,
T. A. BARBOUR.