

(No Model.)

4 Sheets—Sheet 1.

S. E. AUSTIN.
ADDING MACHINE.

No. 403,900.

Patented May 28, 1889.

Fig. 1.

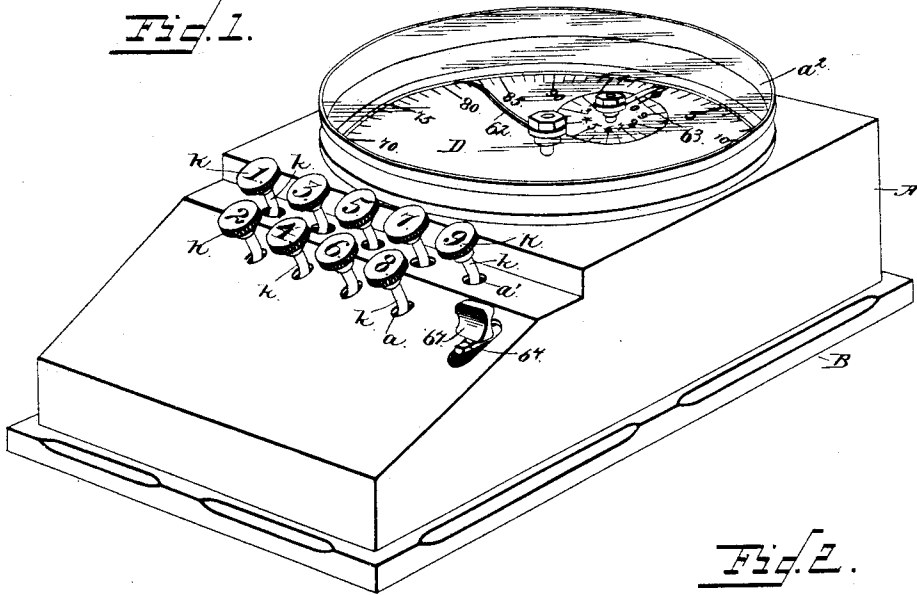
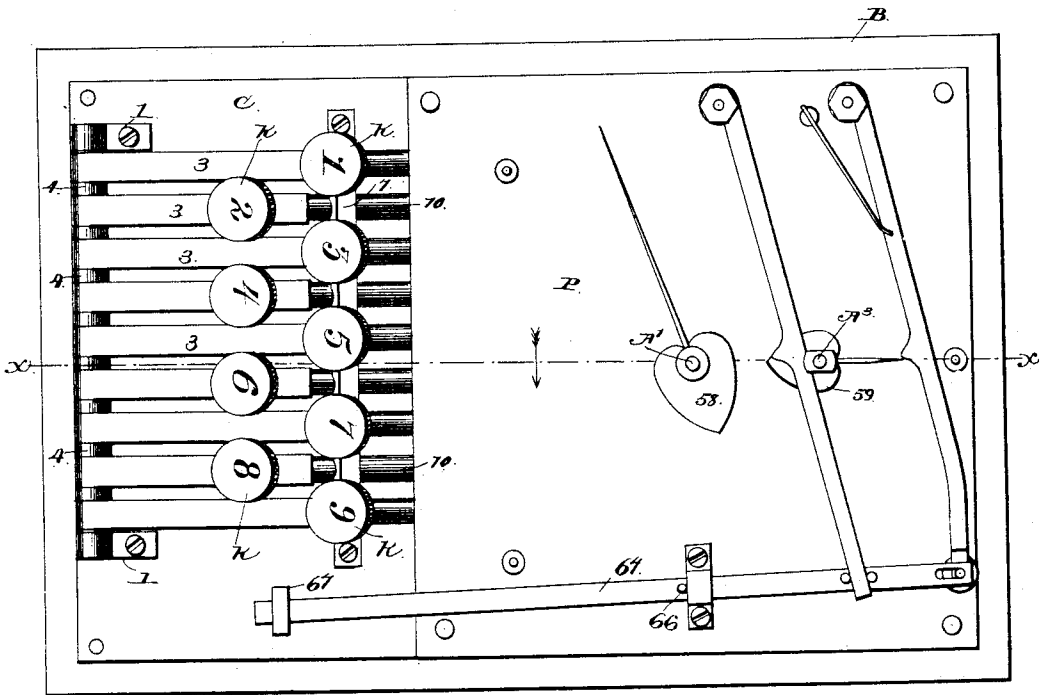


Fig. 2.



WITNESSES.

M. E. Fowler
E. G. Siggers

INVENTOR.

S. E. Austin
by *C. A. Howard*
Attorneys

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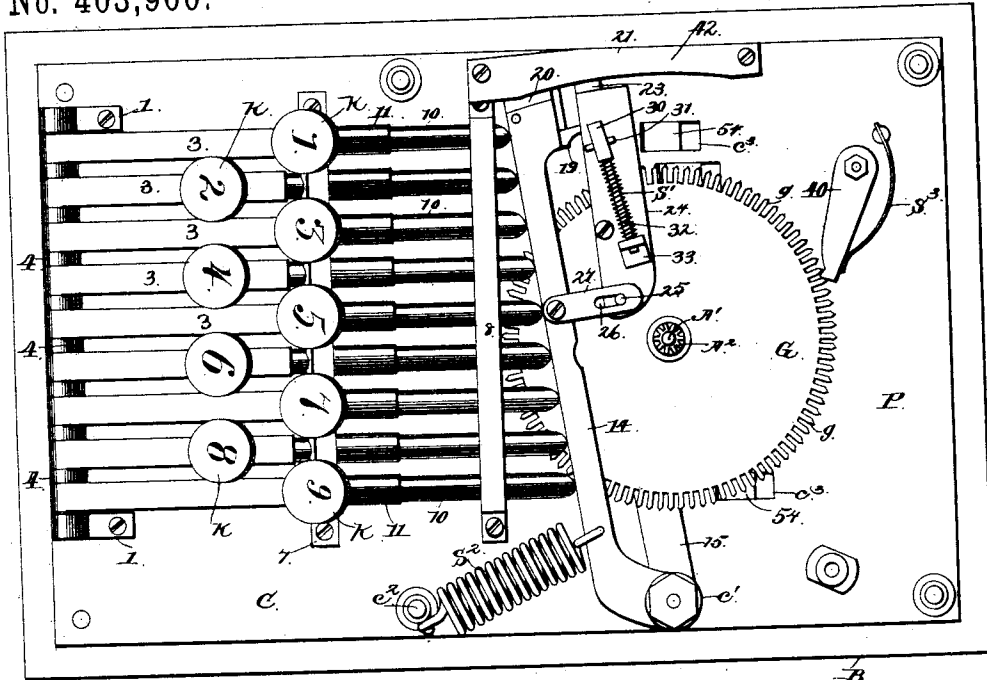
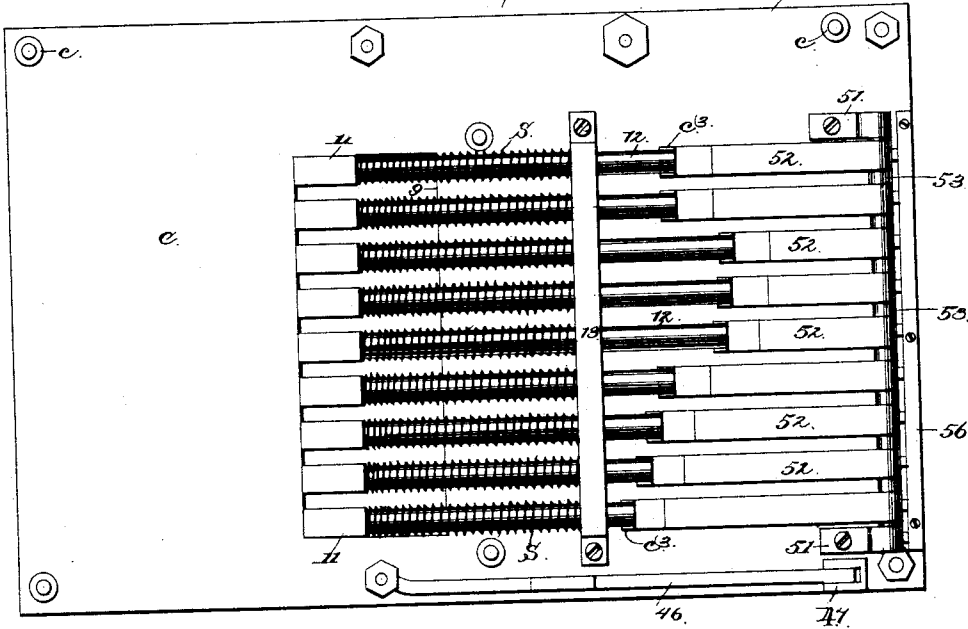


Fig. 3.

Fig. 4.



WITNESSES.

M. C. Fowler
E. J. Siggers

INVENTOR,

S. E. Austin
by *C. H. Fowler*
Attorneys.

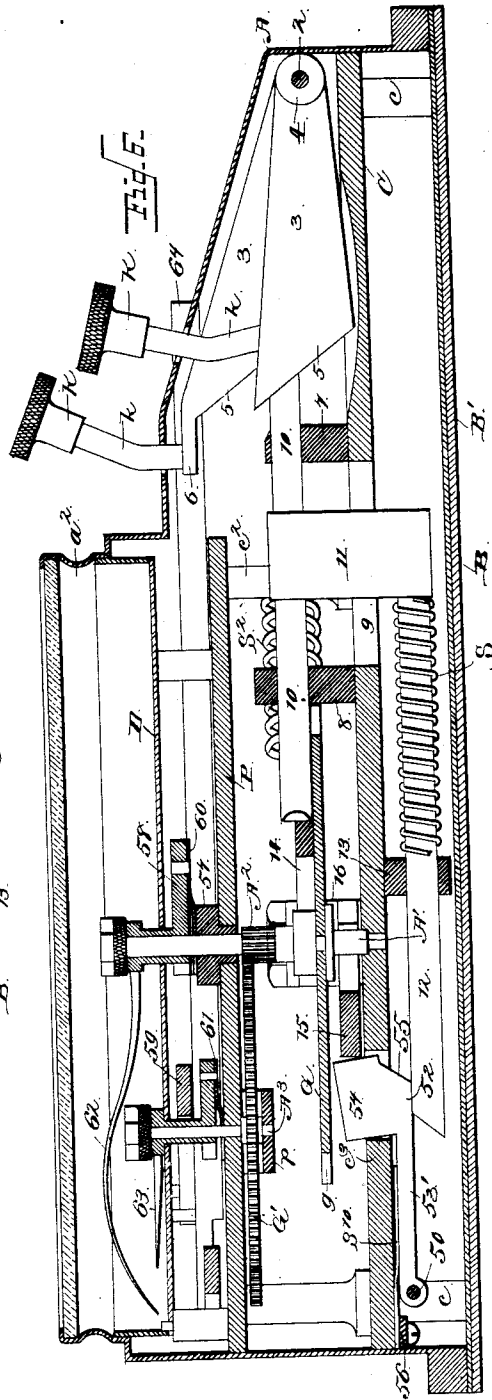
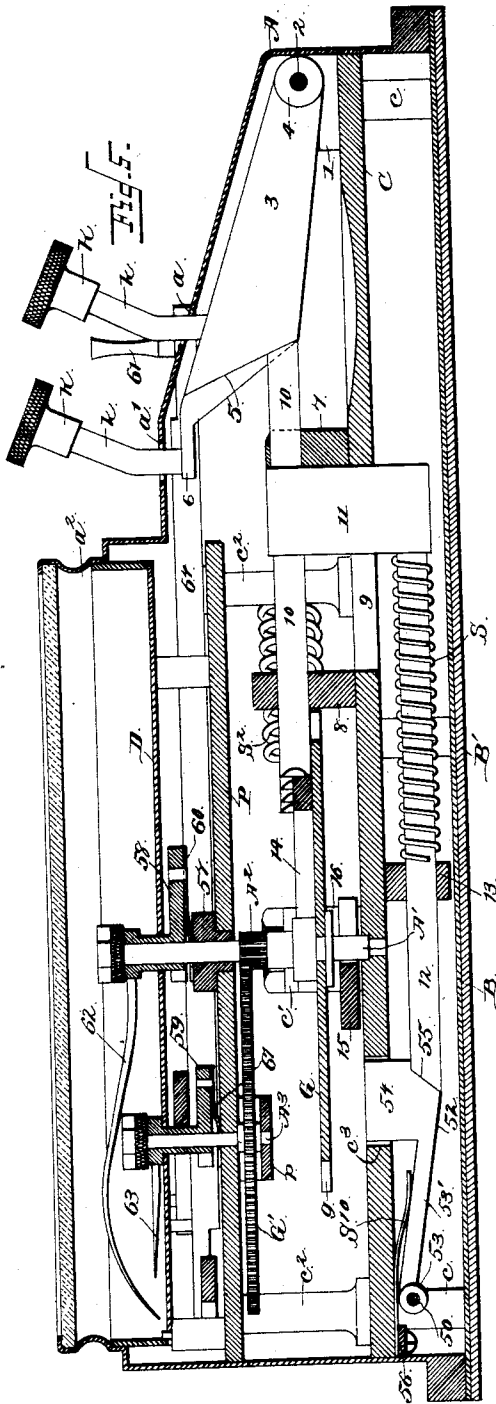
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4 Sheets—Sheet 3.

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WITNESSES

M. E. Fowler
E. G. Siggers

INVENTOR.

S. E. Austin
by C. A. Fowler
Attorneys.

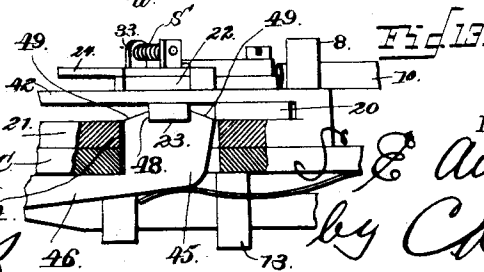
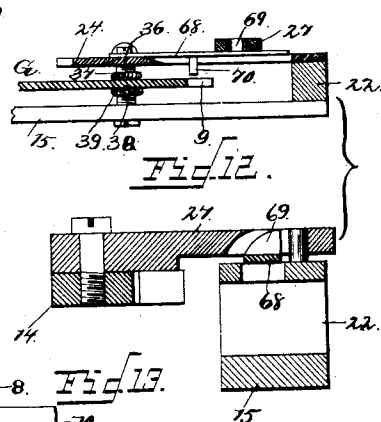
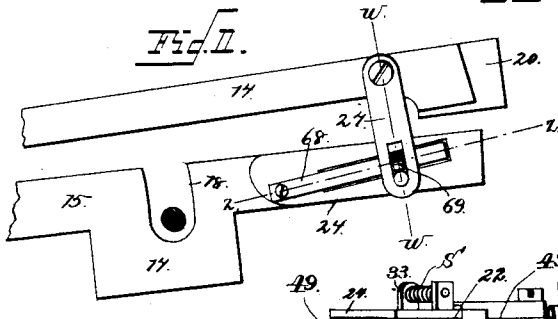
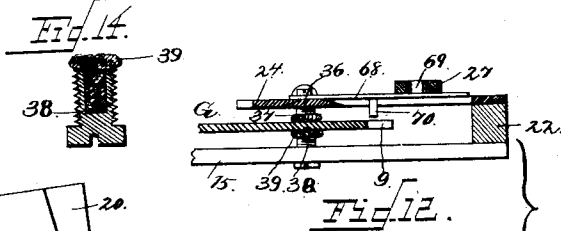
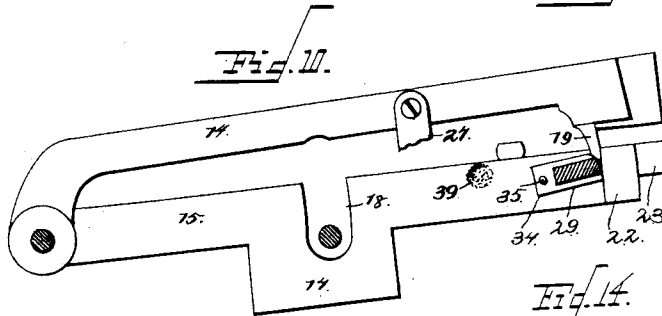
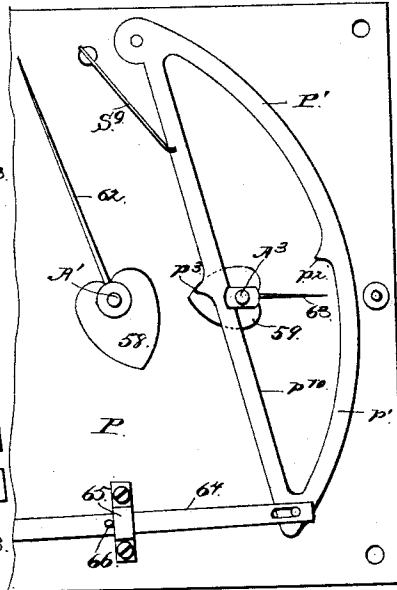
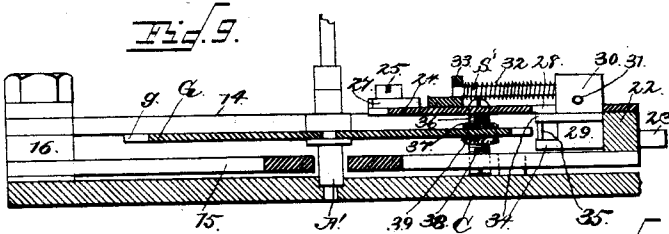
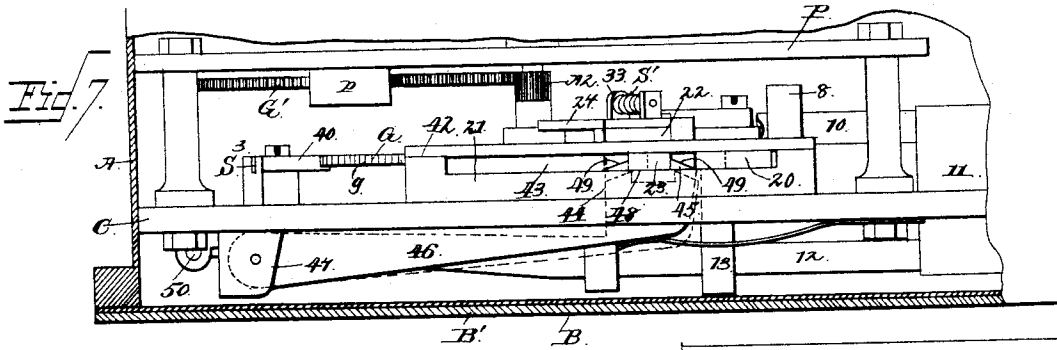
(No Model.)

4 Sheets—Sheet 4.

S. E. AUSTIN. ADDING MACHINE.

No. 403,900.

Patented May 28, 1889.



WITNESSES,

M. Fowler
E. G. Siggers

INVENTOR,

S. E. Austin
by *C. Snowden*
Attorney.

UNITED STATES PATENT OFFICE.

SAMUEL E. AUSTIN, OF FORT VALLEY, GEORGIA.

ADDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 403,900, dated May 28, 1889.

Application filed June 10, 1887. Renewed April 22, 1889. Serial No. 308,214. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL E. AUSTIN, a citizen of the United States, residing at Fort Valley, in the county of Houston and State of Georgia, have invented new and useful Improvements in Adding-Machines, of which the following is a specification.

My invention relates to adding-machines; and it consists in the construction, combination, and adaptation of the parts of the same, which will be more fully set forth hereinafter, and pointed out in the claims.

The primary object of my invention is to construct an adding or calculating machine which will positively and accurately register the sum total of a column of numerals or given series of numbers, and present the result of the addition of the same to view by means of a dial-plate.

A further object of my invention is to provide an adding-machine which is simple and effective in its construction and operation, strong and durable, positive in its results, easily handled and operated, readily understood, and comparatively inexpensive in its manufacture.

I attain these objects by the mechanism illustrated in the accompanying drawings, wherein like letters and numerals indicate similar parts in the several views, and in which—

Figure 1 is a perspective view of my improved adding-machine as complete and ready for use. Fig. 2 is a top plan view of the same with the case and dial removed. Fig. 3 is a similar view with the plate P removed. Fig. 4 is a bottom plan view of the same. Fig. 5 is a longitudinal vertical sectional view on the line $x x$ of Fig. 2, with the inclosing-case in position therewith. Fig. 6 is a similar view showing the position of the mechanism with one of the key-levers depressed. Fig. 7 is a side elevation of a portion of the machine. Fig. 8 is a top plan view of the form of reversing mechanism which I propose to use in connection with my present invention. Fig. 9 is a sectional view showing the construction of the sliding pawl for operating the master-gear. Fig. 10 is a detail sectional view of a portion of the mechanism. Fig. 11 is a modified form of the slide-pawl for operating the master-gear. Fig. 12 illustrates sectional

views of the said modified form of sliding pawl. Fig. 13 illustrates a detail enlarged sectional view through the lever 46 and proximate parts. Fig. 14 is a detail sectional view showing one of the hollow screws filled with felt.

A indicates the casing or covering, which is secured to the base-plate B by means of suitable machine-screws, and is provided with suitable apertures, a and a' , for the passage of the key-posts therethrough and of the reversing-lever. The said casing A is also provided with a bull's-eye, a^2 , adapted to engage with the dial-plate when in position. The plate B is provided on its under side with a suitable covering of leather or other material, B', for the purpose of deadening the sound, and also causing the said machine entire to remain in stable position, as will be readily understood.

To the base-plate B a plate, C, is secured by machine-screws and supported some distance above the base-plate by means of posts c , for the purpose of admitting of a free play of the mechanism secured to the under side of the said plate.

On the top forward portion of the plate C two metallic blocks, 1 1, are secured, which inclose a trunnion-rod, 2, as shown in Fig. 5, upon which the levers 3 are mounted and intersected by washers 4, placed between the levers, and by means of which a positive adjustment of the said levers is obtained. The levers 3 are constructed of suitable hard metal, and are arranged in a slightly-inclined position, and are enlarged at their inner ends and formed with inclined front ends, 5, the angle of incline whereof is from the rear toward the front of the machine. Every alternate lever 3 is provided with a rearward extension, 6, and in said extension the lower ends of the key-posts k are secured, which have the key-heads K secured to the upper end thereof. The intermediate levers, 3, are constructed without the extension 6, and the key-posts k are secured directly to the body of the lever. These key-posts may be constructed in any preferred manner, and preferably have a slightly-forward curved configuration, so as to throw the keys into such a position as to render them convenient for operation and inspection during the use of

the same. By means of the formation of the extension 6 alternately with the portion of the levers provision is made for mounting two rows of keys containing the numerals from 1 to 9, which will operate without interference with each other. The said plate C has a bearing-strip, 7, mounted in connection therewith just ahead of the keys 3, and in the rear of the bearing-strip 7 another bearing-strip, 8, is also secured. These strips 7 and 8 are formed with a series of apertures, and in the plate C, between the strips 7 and 8, an opening, 9, is formed. Mounted in the said strips 7 and 8, and having movement in the apertures thereof, are sliding rods 10, constructed of varying lengths, for a purpose which will be more fully hereinafter set forth and as fully illustrated in Fig. 3 of the drawings.

The sliding rods 10 have depending block projections 11, extending through the opening 9 in the plate C to the under side of the said plate. These projections have rods 12 secured therein in planes parallel with the rods 10, as shown in Figs. 5 and 6. The said rods 12 pass through a bearing-strip, 13, secured to the under side of the plate C at some distance to the rear edge of the opening 9. The rods 12 between the bearing-strip 13 and the depending block projections 11 are encircled by coiled springs S, which tend to return the said rods and their depending block connection to their normal position, as shown in Fig. 4.

The ends of the rods 10 project through the bearing-strip 7, and are formed with inclined faces, which are engaged by the enlarged inclined portion of the key bars or levers 3, as fully illustrated in Figs. 5 and 6. The lower inclined portion of each of the levers 3 rests against the inclined face of the rods 10, and when any one of said levers is depressed the said rods 10 are forced backward, as shown in Fig. 6, for purposes which will be more fully hereinafter set forth.

It will be seen that the inclined inner ends of the levers 3 just cover the outer inclined faces of the rods 10 when the said levers are in a normal position, and thereby a sure engagement at all times must necessarily be the consequence. The opposite ends of the rods 10, which normally project through the bearing-strip 8, are constructed of varying lengths, as said bars represent the numerals from 1 to 9. The rod representing the numeral 1 is much shorter than the rod representing the numeral 9, the increase being gradual in the said rods from 1 to 9. To one side of the plate C, upon a suitable post, c' , a sliding lever, 14, is secured, which projects over across the said plate C in a diagonal direction and normally rests against the inner ends of the rods 10, assuming the transverse inclination thereof. A lever, 15, is also secured to the posts c' below the lever 14 and divided therefrom by a washer, 16. The said lever 15 projects across the plate C in a plane

nearly parallel with the lever 14, but, as shown in Fig. 10, has an enlarged portion, 17, formed with its central portion, having a slot, 18, formed through said bar and extending into the enlarged portion 17, which slot 18 opens out from the front side of the said bar. The lever 14 has a projecting arm, 19, formed with the end thereof, and is also formed with a tenon, 20, which plays in the recessed bearing-strip 21, longitudinally arranged in connection with the plate C. The lever 14 projects over parallel with the lever 15, as hereinbefore set forth, and the lever 15 has a block, 22, formed with its outer end, which is provided with a projection, 23, adapted to play in the bearing-strip 21 in a manner similar to the tenon formed with the lever 14. Secured to the top portion of the block 22, and projecting over and above the said lever 15, is a plate, 24, which has a pin, 25, in its farthest end, which engages with the slot 26, formed in one end of a connecting-link, 27, which is secured at its opposite end to the lever 15, as shown in Fig. 3. The under side of the connecting-link 27 is formed with a recess which permits of considerable play between the levers 14 and 15, as will be more fully hereinafter set forth. In the metallic strip 24 a diagonal slot, 28, is formed, in which a sliding block, 29, is mounted, having projecting portions thereof protruding into and through the said diagonal slot 28. The projection 30 extends above the top surface of the plate 24 and is retained in position in the said slot by a pin, 31, passing transversely therethrough. In this portion of the block a rod, 32, is secured, which projects diagonally across the plate 24 and is movably mounted in connection with an angle-block, 33, and between said angle-block 33 and projection 30, and surrounding the rod 31, is a coiled spring, S' , which has the tendency to press the block 29 to one side of the slot in which the projections work. Beneath the plate 24 the block 29 is formed with two projecting flanges, 34, which inclose a rod, 35. This rod 35 is arranged in a vertical position and travels in a plane diagonal to the plane of the plate 24. Above the lever 15 and below the lever 14 the master-gear G is mounted upon an arbor, A' , extending upwardly from the plate C and through the central recess formed in the enlarged portion of the lever 15.

The sliding pawl or block 29, hereinbefore described, is arranged on a line nearly direct with the radii of the master-gear, and the rod 35 is adapted to engage with the intersecting spaces of the teeth g of the master-gear G at a slight angle to the angle of presentation of the said teeth. To steady the movement of the master-gear, a hollow screw, 36, passes through the plate 24, and having been supplied with a filling of felt, 37, presses directly on the upper face of the said master-gear. Directly under the position occupied by the said hollow screw 36 a small washer or

similar screw, 38, is secured in the lever 15, having a felt-top bearing-surface, 39, which engages with the under face of the said master-gear. The projecting arm 19, formed with the lever 14, extends in under the plate 24 and engages the rear side of the block 29 and shoves it forward against the reaction of the spring S' until the pin 35 engages with the space between the teeth *g* of the master-gear.

G. To return the said lever 14 to its normal position and disengage the said arm 19 from the rear of the block 29, a coiled spring, S², is secured to the rear portion of the lever 14 at one end and to a post, c², projecting upwardly from the plate C. The motion of the master-gear is also limited by the action of a pawl, 40, mounted upon a post secured to the plate C, the said pawl 40 being formed with a recess and projection on its forward end, which passes in the intersecting space of the teeth *g* and retains the wheel in a fixed position when the levers 14 and 15 have been shoved backward as far as possible by the rods 10, and which will be varied proportionately to the length of the said rods. This pawl 40 is engaged by a flat spring, S³, supported on a post extending upwardly from the plate C, the function of which spring will be readily understood.

The bearing-strip 21 has a covering-plate, 42, which is screwed on the upper projecting ends thereof, forming a recess, 43, in which the ends of the levers 14 and 15 have movement, as hereinbefore set forth. The said strip 21 has a slot, 44, (see Fig. 7,) cut there-through, which extends through the plate C, through which the angular projecting end 45 of the lever 46 projects and has movement. The said lever 46 is pivoted in ears 47 at the rear under portion of the plate C, and from its pivotal point extends upwardly on an incline to its enlarged angular projection 45, so as to allow a depression thereof without an interference thereby with the base-plate B.

The top edge of the said lever is also formed with a downward incline, which provides for a vertical movement of the enlarged portion 45, and at the same time allows the upper side of the said lever to come up flush with the under side of the plate C. The upper edge of the projecting portion 45 is provided with a recess, 48, and from each upper end of the shoulders formed by the said recessed portion 48 inclines 49 are constructed, which extend downward to the edges of the projection 45. The projection 23, formed with the lever 15, and the tenon 20, formed with the lever 14, play in the recess of the bearing-strip 21 as they are slid backward in the operation of the machine.

When any one of the key-levers 3 is depressed and comes in contact with the rods 10, the said rods 10 strike the front edge of the lever 14, which rides up the inclines on the top edge of the projection 45 of the lever 46 and strikes the projection 23 and shoves it forward in the recessed portion of the bearing-

strip 21, at the same time depressing the said lever 46. The normal position of the projection 23 in connection with the lever 15 is in the recess formed in the top portion of the projection 45, formed with the lever 46. At every return movement of the said levers 14 and 15 the projection 23 engages with the recess in the top portion of the projection 45 and is retained thereby, (see Fig. 7,) thus adjusting said levers 14 and 15 in a position relative to the ends of the rods 10 and with the remaining mechanism and in a position ready to have a similar operation and function.

In the under rear portion of the plate C a trunnion-rod, 50, is mounted between ears 51, secured upon the said plate, and upon this rod 50 a series of levers, 52, are mounted, which are separated by washers 53. As shown in Figs. 5 and 6, the levers 52 are formed with a reduced plane portion, 53', which, when the said levers are not in operative positions, will project downwardly on an incline toward the base-plate B. Integrally formed with the forward ends of the said levers 52 are enlarged projections 54, which have forward inclined recess portions 55, which have the corresponding configuration as and are adapted to engage with the inner end of the rods 12, as shown in Fig. 5. When, however, the said rods 12 are projected toward the rear portion of the machine, as shown in Fig. 6, the said rods ride off of the recess 55 and pass under the said levers 52, as shown, thereby raising the said levers 52 and projecting the enlarged portions 54 thereof up through slots c³, formed in the plates C. When the lever 15 is slid backward by the rods 10, as hereinbefore described, engaging with the lever 14, the natural tendency of the said lever 15 would be to have too great a motion, and consequently make the device impracticable and useless. To obviate this difficulty the projections 54, formed with the levers 52, engage the rear edge of the levers 15 and form a means of limitation therefor. The levers 52 are formed of varying lengths and proportionate to the rods 10 and 12 and to the operating mechanism of the machine. In like manner the central rearward projection on the lever 15 is adapted to engage with the shorter series of levers 52, and thereby provide a construction whereby compactness and non-interference of the mechanism are obtained. These levers 52 form the rear guards for limiting the movement of the lever 15, as hereinbefore stated, and as any one of the key-levers 3 is depressed its corresponding rod 12, which is in engagement with one of said levers, raises the same and forces the projection 54 above the surface of the plate C. When the said lever 15 thence slides back, due to the motion imparted thereto, as hereinbefore set forth, the lever strikes against the projection 54, which may be above the surface of the plate C, and prevents the further backward movement of the said lever 15. By this motion,

also, the further revolution of the master-gear G is prevented, and the number of teeth corresponding to the number of the lever depressed are revolved past the pawl in connection with the rear portion of the master-gear.

The several levers 52 are proportionately and relatively arranged in connection with the rods 12, and are returned to their normal positions by springs S¹⁰, secured to a plate, 56, and projecting over on the top surface of the said levers 52, as shown in Figs. 5 and 6.

Upon the arbor A', directly above the upper face of the master-gear G, a collar is mounted, and upon the top portion of the collar a spur-pinion, A², is secured, which has ten teeth formed therein. Upon the posts or standards c² a plate, P, is mounted, which is adapted to cover the rear mechanism of the machine. The arbor A' passes through an aperture in this plate and through a steel bearing-collar, 57, which rests on the top surface of the plate P, while the arbor projects above the top surface of the plate P. In a suitable bracket, p, secured to the under side of the plate P, an arbor, A³, is mounted, being stepped in the said bracket on the lower side of the plate and projecting above the upper surface of said plate, for a purpose which will be more fully hereinafter set forth. Upon the said arbor a gear-wheel, G', is mounted, having one hundred teeth formed therein, and connected with the spur-pinion A², and consequently has one-tenth the revolution of the said pinion. The arbors A' and A³ project upwardly through a dial-plate, D, and have indices secured to the upper ends thereof, which move in connection with a scale of figures representing units and tens.

Upon the top surface of the plate P and passing over and seated on the arbors A' and A³ are two heart-cams, 58 59, having springs 60 and 61 on their under sides. On the top portion of the said arbors, also, the indices 62 and 63 are mounted, the one 62 engaging with the unit-scale, which is constructed with one hundred divisions, from 5 to 100. The other index, 63, engages with the ten-scale, which is formed with ten divisions, from 1 to 10. In the operation of the machine the revolution of the index 62 presents an added total in the units-column, and if said index runs around to the mark representing 100 the index 63 will be made to point to the mark 1 on the ten-scale. By this means it will be seen that the index 63 will indicate 1,000 on an entire revolution thereof around the face of the dial on which it operates.

When it becomes necessary to reverse the indices and bring them to the points marked "Zero," at the upper portion of the dials, one of two mechanisms may be used to accomplish this result, one of which is shown in Fig. 2 and the other in Fig. 8. The mechanism shown in Fig. 2 is similar to that shown in a patent granted to me of recent date, and in this instance I propose to use the mechanism shown in Fig. 8. Pivoted to one side

of the plate P is a lever, P', which is constructed with a straight portion, p¹⁰, and a semicircular bend, p'. This lever P' is constructed in one piece, and has two central projections, p² p³, constructed, respectively, with the edges of the parts p¹⁰ p' nearest the arbors A' A³. These central projecting portions are adapted to engage with the depressions in the heart-cams or with any surface of the same which may be presented thereto. When the said projections strike the heart-cams, they return the indices to the points marked zero on the dial, in a position ready to begin the addition of a column of figures. To the side opposite the pivotal point of the said lever P' a pull-lever, 64, is secured, which passes through a bearing-block, 65, secured on the top surface of the plate P, said lever having a stop-pin, 66, passing transversely therethrough, which rests against the said bearing-block 55 when the said lever has returned to its rearward normal position. The front end of the draw-lever 64 is provided with an operating-handle, 67, which projects through the front portion of the casing adjacent to the keys. Near the pivotal point of the said lever P' a spring, S⁹, is mounted, which bears against the straight portion p of the said lever and has a tendency to return the same to its rearward normal position, as will be readily understood.

In Figs. 11 and 12 I have illustrated a modified form of my slide-pawl. In this instance the connecting-link 27 is situated nearest one end of the lever 14, and in like manner has a slot in its end which engages with a pin or stud connected to the top portion of the projecting plate 24. A transverse slot is also formed in this plate 24, as in the form hereinbefore described, but of greater extent than said form of slot, and a flat spring, 68, is secured to the top surface of the projecting plate 24 and extending over the said slot Upon the top surface of this spring 68, and nearest one edge thereof, is a cam-block, 69, whose downward-curved surface is presented to the forward edge of the slot in the link 27 for engagement. On the under side of this spring 68 a pin or stud, 70, projects downwardly therefrom, as shown in the first sectional view of Fig. 12, which is taken on the line z z of Fig. 11. This projecting stud or pin 70 engages with the teeth of the master-gear G and revolves the same in manner similar to the form hereinbefore described, and as will be readily understood. In this instance, however, the projecting arm on the end of the lever 14 is dispensed with, as is also the sliding arrangement of the pawl hereinbefore set forth, the movement in this instance being in a vertical plane at right angles to the plane of action of the slide-pawl hereinbefore described; but, as in the said form hereinbefore set forth, the engagement between the stud or pin 70 is on a radial line with the master-gear G. It will be understood in this instance that the lever 14 also

has movement in a manner similar, as hereinbefore set forth, striking against the lever 15 and shoving the link 27 over the top surface of the spring 68 and engaging with the cam-surface 69 thereon and operating the pin or stud 70, as hereinbefore set forth. In the second sectional view of Fig. 12, which is taken on the line *w w* of Fig. 11, the construction of the cam-surface and the slot in the link 24 is fully illustrated.

The operation of my improved device is as follows: Upon the depression of any one of the keys *K* the levers move downward over the ends of the rods 10, and in their downward depressions they are given unlimited movement as far as necessary by the depression formed in the top surface of the plate *C*, immediately under the levers 3. In shoving the said rods 10 backward, the master-gear is revolved by the mechanism hereinbefore set forth, as many teeth being shoved around as may be engaged by the lever. The motion of the slide-pawl in connection with the levers 15, acting directly with the teeth and the master-gear *G*, revolves it with a sudden impetus, which is directly translated to index mounted upon the arbor of the said gear. When the sliding rods 10 are pushed forward by the key-levers *K*, the rods 12 are correspondingly pressed forward. Each rod 10 has a rod, 12, which moves in unison therewith, and the lengths of the rods 10 and 12 are proportionate. The rods 10 actuate the propelling devices for the master-gear, while the rods 12 actuate the stop mechanism to limit the movement of the propelling devices. The sliding rods 10 come in contact with the lever 14 in their movements, while the rods 12 contact with the stop-levers 52. These stop-levers 52 are projected in advance of the lever 15 to limit the movement of the latter. Both levers 14 and 15 have a common connection with the actuating devices for the master-gear *G*, and, as both levers 14 and 15 are movable simultaneously, it will be understood that when the stop-levers 53 are actuated and thrown up in advance of the lever 15 the further movement of both levers 15 and the lever 14 is prevented. Thus, as one of the sliding rods 10 is pushed forward against the lever 14, the latter is moved, and its first movement pushes the pawl or sliding block 29 into engagement with the teeth of the master-wheel *G*. At the same time the lever 15 is moved along with the lever 14, and the further movement of both levers actuates the wheel *G* until the lever 15 comes in contact with the stop 54, which has been thrown up by the rod 12 to limit the lever 15 in its movement. The range of movement given to the levers 14 and 15 determines the number of teeth which are to be engaged by the sliding pawl 29 and the consequent degree of rotation of the gear *G*. Thus, when the key-lever for numeral 9 is operated, its rod 10 will be caused to project the lever 14 a greater distance than when the key-lever of numeral 7 is operated. Correspond-

ingly the stops 54 are set at greater distances from the lever 15, so that when the key-lever for numeral 9 is operated its corresponding stop will be thrown up at a greater distance from the lever 15, and thus allow a greater range of movement for said lever than when the key-lever of numeral 6 is depressed. It will be understood, however, that the impetus with which the gear *G* revolves is limited by the stop mechanism hereinbefore described, and, being translated to the arbor upon which the master-gear is mounted, it necessarily imparts motion to the spur-pinion mounted in connection with the said arbor above the master-gear, this spur-pinion being formed with ten teeth, so that one revolution of the master-gear *G* revolves the spur-pinion once, which in turn imparts motion to the gear *G'*, which revolves in a reverse direction to the master-gear *G*. It takes one complete revolution of master-gear *G* to move the gear *G'* enough to advance the pointer 63 one space. This is due to the fact that spur-pinion *A*² has but ten teeth. When the gear *G'* moves by the engagement of spur-pinion *A*² therewith, it is turned one space when the pinion *A*² has made a complete revolution. The large index revolving in one direction indicates units and tens up to one hundred, while the smaller index revolving in the reverse direction indicates hundreds up to one thousand.

My improvement is especially useful for the rapid calculation of a series of written or given numbers, and is especially advantageous in large counting and other mercantile houses. The construction of the several parts of the device is such that every portion thereof will move in relative time to the parts with which it connects, and the parts of themselves of such durable construction and positive operation that no danger is incurred of displacement of any parts thereof and a consequent inaccuracy in the operation of the parts of the machine.

The novelty and utility of my improved device being obviously apparent, it is unnecessary to further enlarge upon the same herein.

It is obvious that many minor details in the construction and arrangement of the several parts may be made and substituted for those herein shown and described without in the least departing from the principle and nature of my invention.

Having thus described my invention, I claim—

1. In an adding-machine, a series of sliding rods of different lengths having forward-inclined ends, and a series of key-levers having corresponding projecting inclined ends adapted to engage with the forward ends of the said rods, substantially as described.

2. The combination, with the sliding rods having depending projections formed therewith, a spring-actuated rod connected to the said depending projection, and the key-levers, substantially as described.

3. In an adding-machine, the series of sliding rods of different lengths, the key-levers for actuating the same, the levers 14 and 15, to be actuated by the rods, and the registering mechanism worked by the movement of the levers 14 and 15, as set forth.

4. The combination, with the sliding rods of varying lengths mounted in suitable bearing-strips, of the key-levers engaging with the forward ends thereof, the lever 14, normally resting against the inner ends of said rods, and the coiled spring for returning said lever 14 to its normal position, substantially as described.

5. In an adding-machine, the combination of the key-levers 3, having the enlarged inclined ends 4, the projections 5, alternately formed with said lever, the key-post projecting above the said levers, and the sliding rods 10, of varying lengths, with which said levers engage, substantially as described.

6. The combination of the key-levers, the sliding rods 10, having rods 12, encircled by coiled springs connected to the under part thereof, levers 14 and 15, and the stop-levers 52, the registering mechanism operated by rods 10, and the stop mechanism operated by rods 12, substantially as described.

7. The combination, with the rods 10, having the projections 11, of the rods 12, encircled by coiled springs, substantially as described.

8. The combination, with the rods 10, having the projections 11, of the rods 12, encircled by coiled springs, the levers 52, having the projecting ends 54, and the spring for returning said levers 52 to their normal position, substantially as described.

9. The combination, with the levers 14 and 15, of the slide-pawl in connection with the lever 15 and the master-gear G, the stop mechanism for the lever 15, and the key-levers for actuating lever 14, and also to control the stop mechanism, substantially as described.

10. The combination, with the levers 14 and 15, of the key-levers for actuating the said levers 14 and 15, the slide-pawl in connection with the lever 15, the master-gear G, in connection with the arbor A', and the index on the top portion of said arbor, substantially as described.

11. The combination, with the levers 14 and 15, of the spring-actuated slide-pawl in connection with the lever 15, operating in a line to the center of the master-gear G, the key-levers for working the levers 14 and 15, and the spring-actuated pawl for holding the master-gear in its desired position, substantially as described.

12. In an adding-machine, the combination, with the master-gear G, connecting with the registering mechanism, of the lever 15, for actuating the same, said lever having the hollow screws adapted to be filled with felt or the like and engaging the surface of the said master-gear, as set forth.

13. The combination, with the lever 14, of

the link 27 connecting said lever with the lever 15, the slide-block or pawl 29, and the vertically-arranged stud or pin adapted to engage the teeth of the master-gear G, substantially as described.

14. The combination, with the lever 15, carrying the spring-actuated sliding pawl, and the lever 14, of the arms projecting outwardly from the side thereof and adapted to engage with the spring-actuated sliding pawl, and the key-levers and sliding rods for actuating the lever 14, substantially as described.

15. The combination, with the lever 15, having the central recessed enlargement, of the stop-levers 52, having the forward enlarged ends, and the spring for returning said levers to their normal position, whereby the movement of the said lever 15 is limited proportionately to the length of the slide-rod 10, substantially as described.

16. In an adding-machine, the combination, with the key-levers, of the rods 12 actuated thereby, the master-gear G, the lever 15, operated by the key-levers, and the stop-levers 52, operated by the rods 12, as set forth.

17. The combination, with the slide-rods 10, connecting with the registering mechanism, of the key-levers 3, having the enlarged inner inclined ends, whereby a positive motion between the two parts is at all times afforded, substantially as described.

18. The combination, with the levers 14 and 15, of the slide-pawl carried by the lever 15, the master-gear operating in connection with said slide-pawl, and the pinion mounted upon the same arbor as the master-gear, substantially as described.

19. In combination with the master-gear G' and the actuating mechanism therefor, rods 10, of different lengths, to work the actuating mechanism, the rods 12, encircled by springs and of varying lengths, and the levers 52, which are adapted to be projected upward to limit the movement of the actuating mechanism for the master-gear, substantially as described.

20. In combination with the levers 14 and 15, the diagonally-arranged slots in said lever, the slide-block arranged in connection with said diagonal slots, the spring-actuated rod, and the vertically-arranged pin mounted in the said sliding block and adapted to engage with the teeth of the master-gear, substantially as described.

21. The combination of the lever P', having the straight and curved portions p and p' formed integrally, the central projections formed therewith, the heart-cams mounted on the arbors of the indices, and the draw rod or lever whereby the indices may be returned to their normal position, substantially as described.

22. The combination, with the levers 3, constructed as herein set forth, of the slide-rods 10, the spring-actuated rods 12 in connection therewith, the levers 14 and 15, the slide-pawl mounted in connection with the lever

15, the master-gear G, the rear pawl adapted to engage with the said master-gear, and the stop-levers 52, substantially as described.

23. The combination, with the plate C, of the bearing-strips 7 and 8, mounted thereon and forming the front and rear walls of a slot, 9, constructed in said plate, and the slide-rods 10, having the depending projections 11, to which the rods 12 are secured, substantially as described.

24. In combination with the master-gear G, the hollow screws filled with felt and engaging the faces of the gear, as and for the purpose set forth.

25. In combination with the master-gear G, connecting with the registering mechanism, the spring-actuated graduated rods 10, the key-lever actuating the rods 10, the swinging lever engaging and turning the master-wheel, the said swinging lever being actuated by the rods 10, and the stop mechanism, also actuated by the movement of the sliding rods 10 to limit the movement of the swinging lever, as set forth.

26. In combination with the master-wheel G, connecting with the registering mechanism, the spring-actuated graduated rods 10, the transmitting mechanism operated by the sliding rods to move the wheel G, and the stop mechanism, also operated by the sliding rods to limit the movement of the transmitting mechanism and correspondingly limit the movement of the wheel G, as set forth.

27. In combination with the key-levers, the spring-actuated graduated sliding rods 10 operated thereby, the spring-actuated swinging levers operated by the sliding rods, the wheel G, the pawl on the levers to engage the wheel, and the stop-levers 52, also graduated and operated by the rods 10 to be thrown up in advance of the swinging levers to limit the movement of the latter, as set forth.

28. In combination with the master-gear G, the swinging levers to engage and actuate the gear, the key-levers to move the swinging levers, and the hollow screws filled with felt and fitted to the swinging levers, the felt being pressed by the screws against the gear, as set forth.

29. In combination with the master-gear G, the spring-actuated swinging levers 14 15, arranged above and below the gear, the pawl carried by the lower lever, 15, to engage the gear, the spring-actuated sliding rods 10 12, actuated by the key-levers, the rods 10, actuating against the lever 14, the stop-levers 52, to limit the movement of the lever 15, said stop-levers being actuated by the rods 12, as set forth.

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

SAMUEL E. AUSTIN.

Witnesses:

EDWARD A. BURGESS,
SAML. LLOYD.