

O. OSTBYE.
ADDING MACHINE.

APPLICATION FILED JULY 12, 1906. RENEWED JUNE 15, 1908.

908,124.

Patented Dec. 29, 1908.

2 SHEETS—SHEET 1.

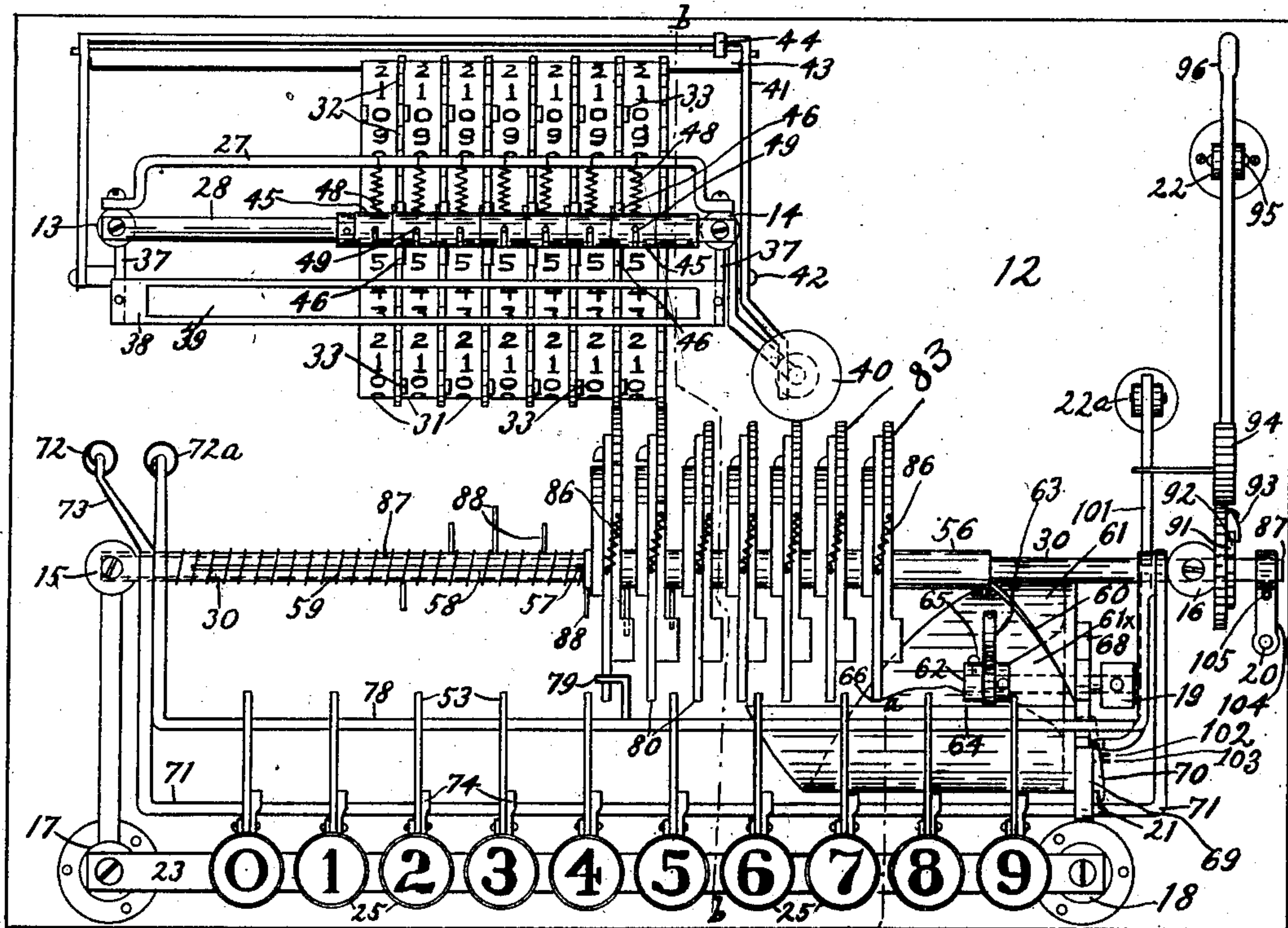


FIG. 1.

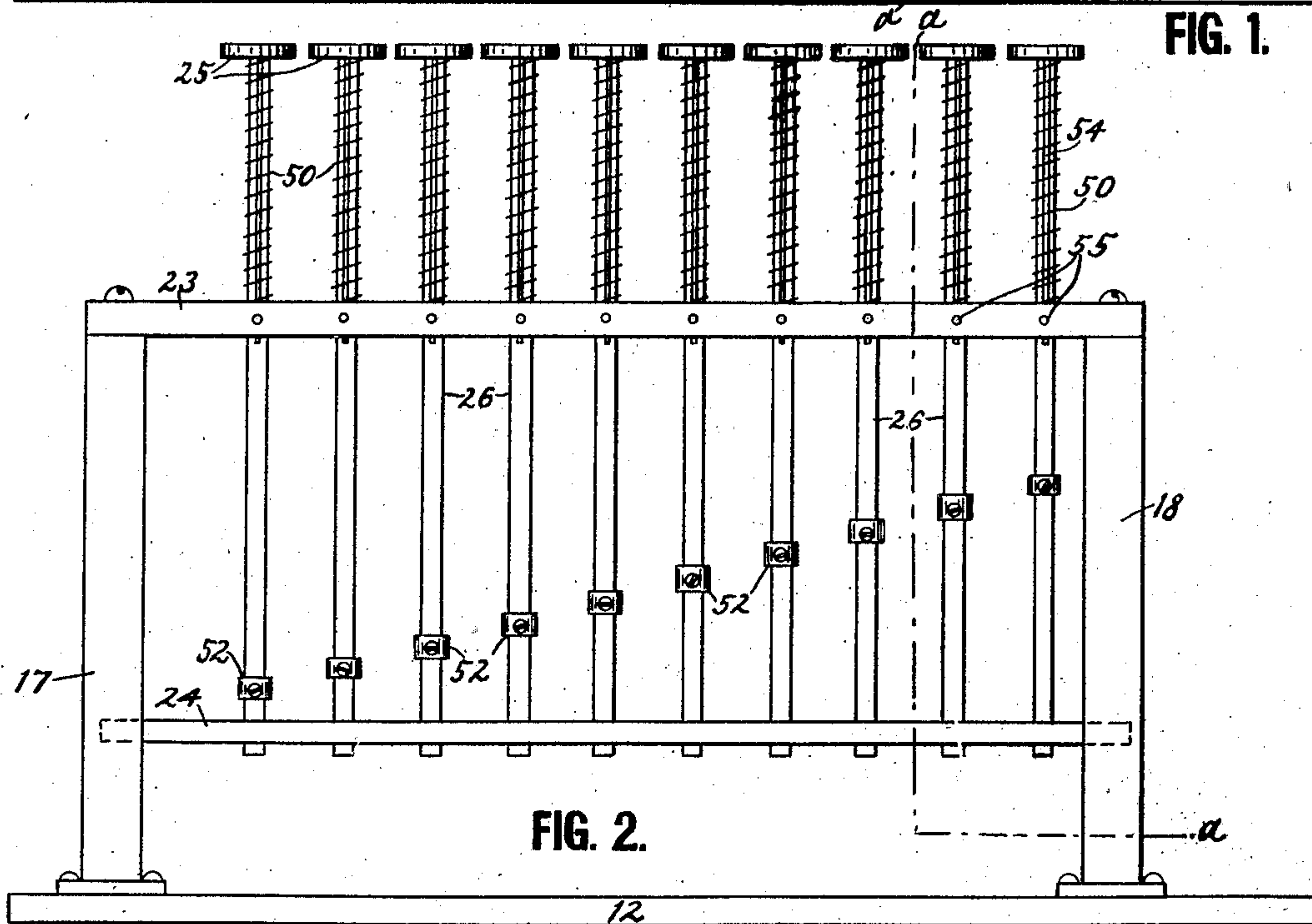


FIG. 2.

WITNESSES:

D. E. Carlsen.
E. C. Carlsen.

INVENTOR:

Ole Ostbye.
BY his ATTORNEY:
A. M. Carlsen.

O. OSTBYE.
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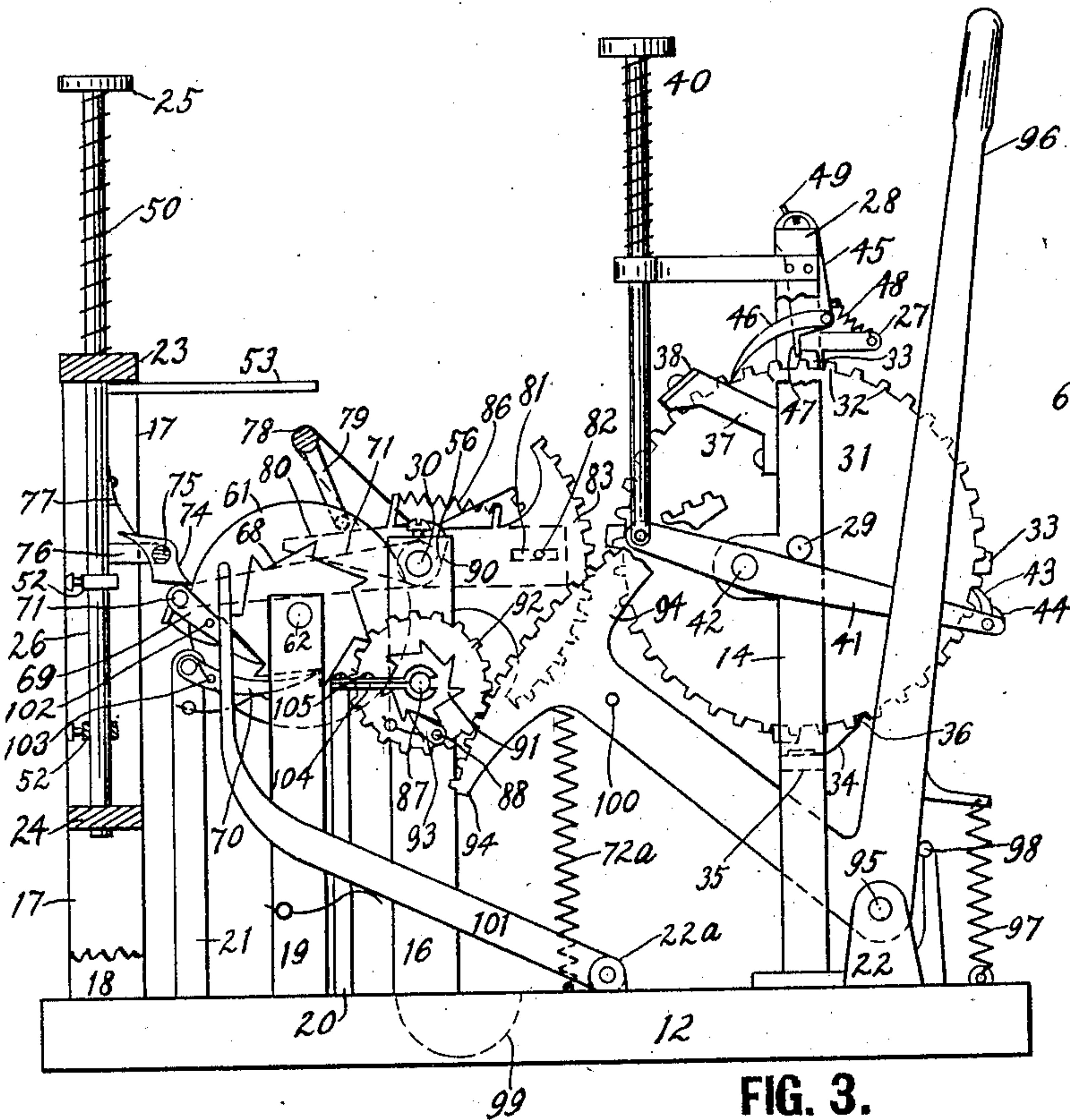


FIG. 3.

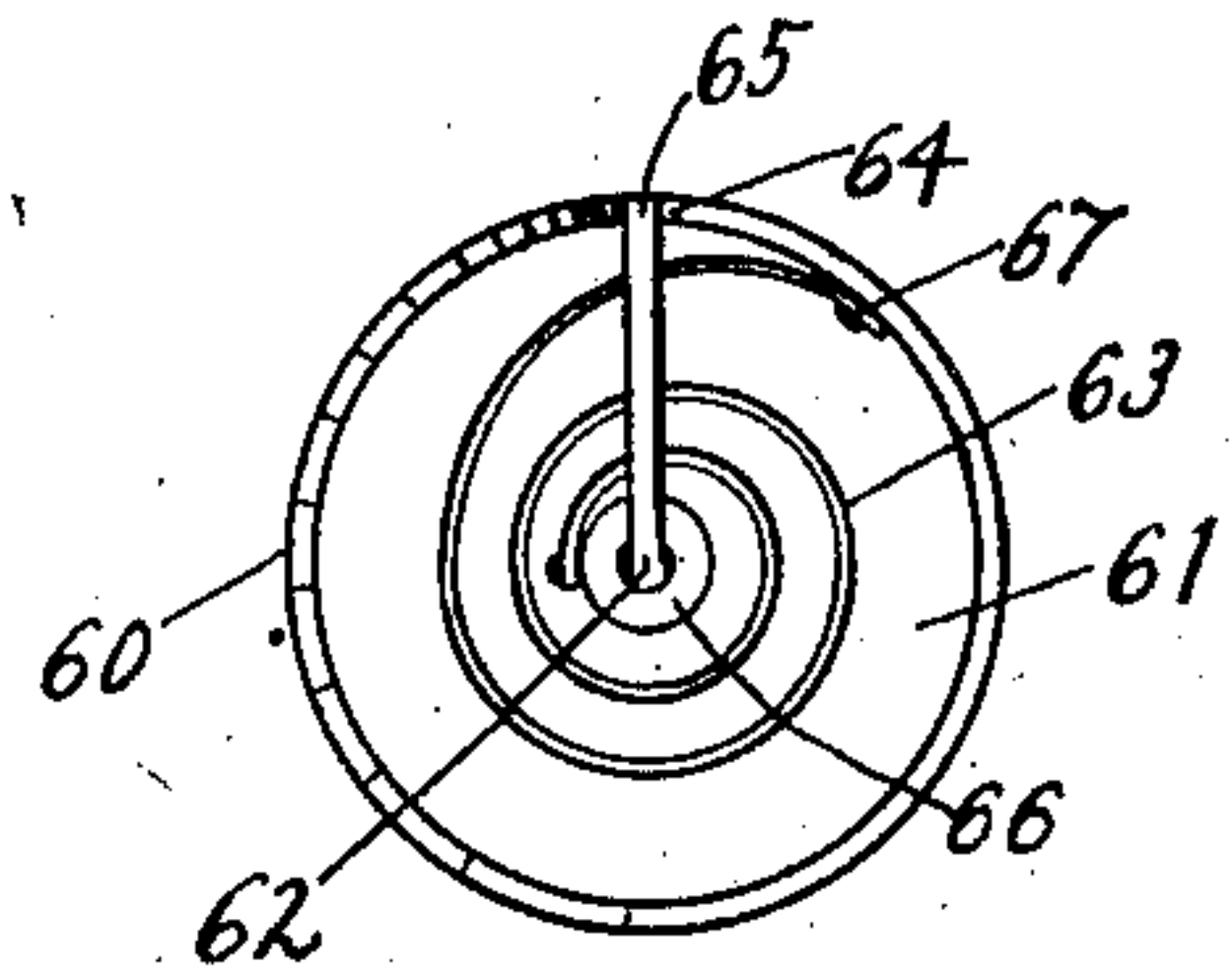


FIG. 6.

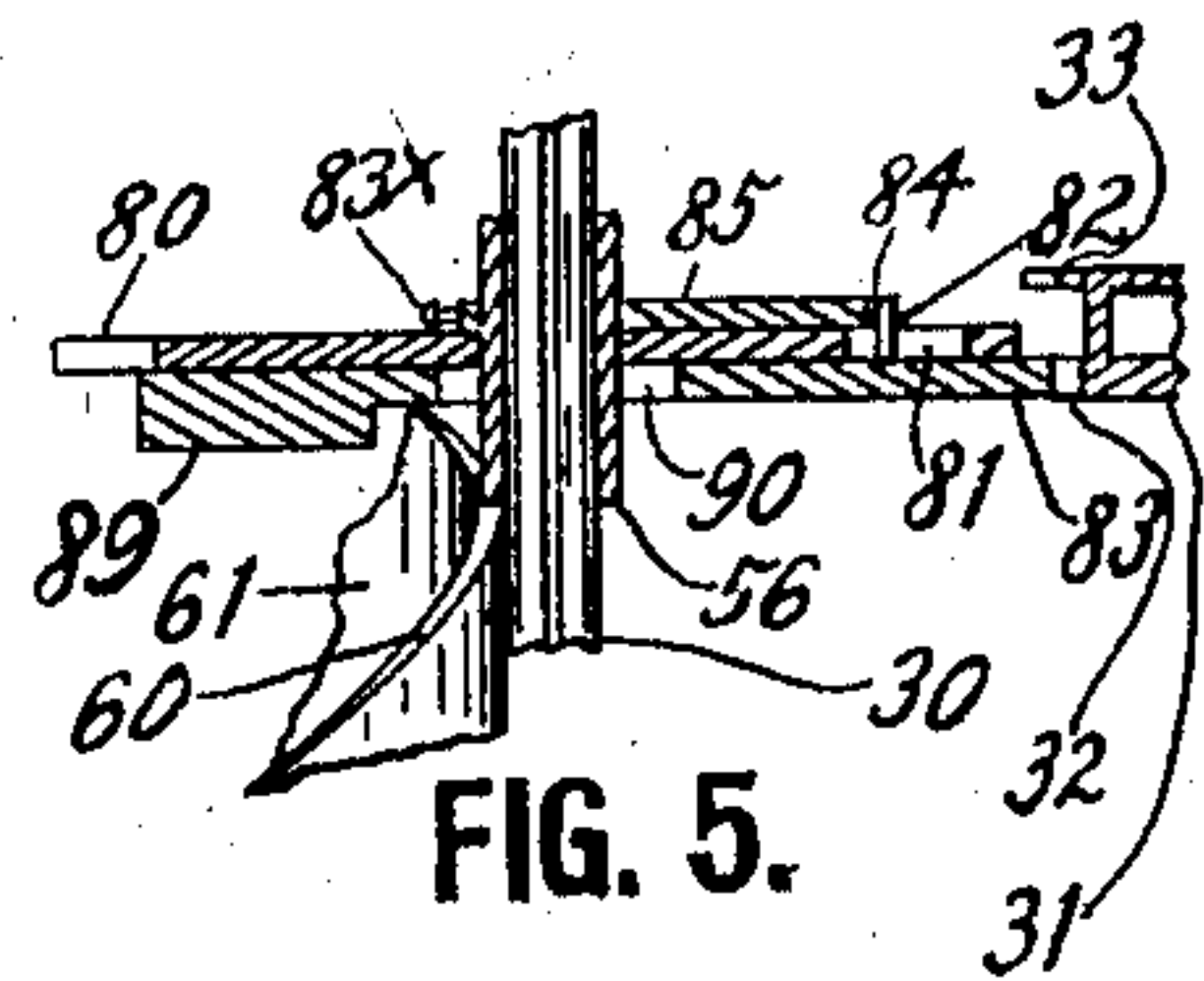


FIG. 5.

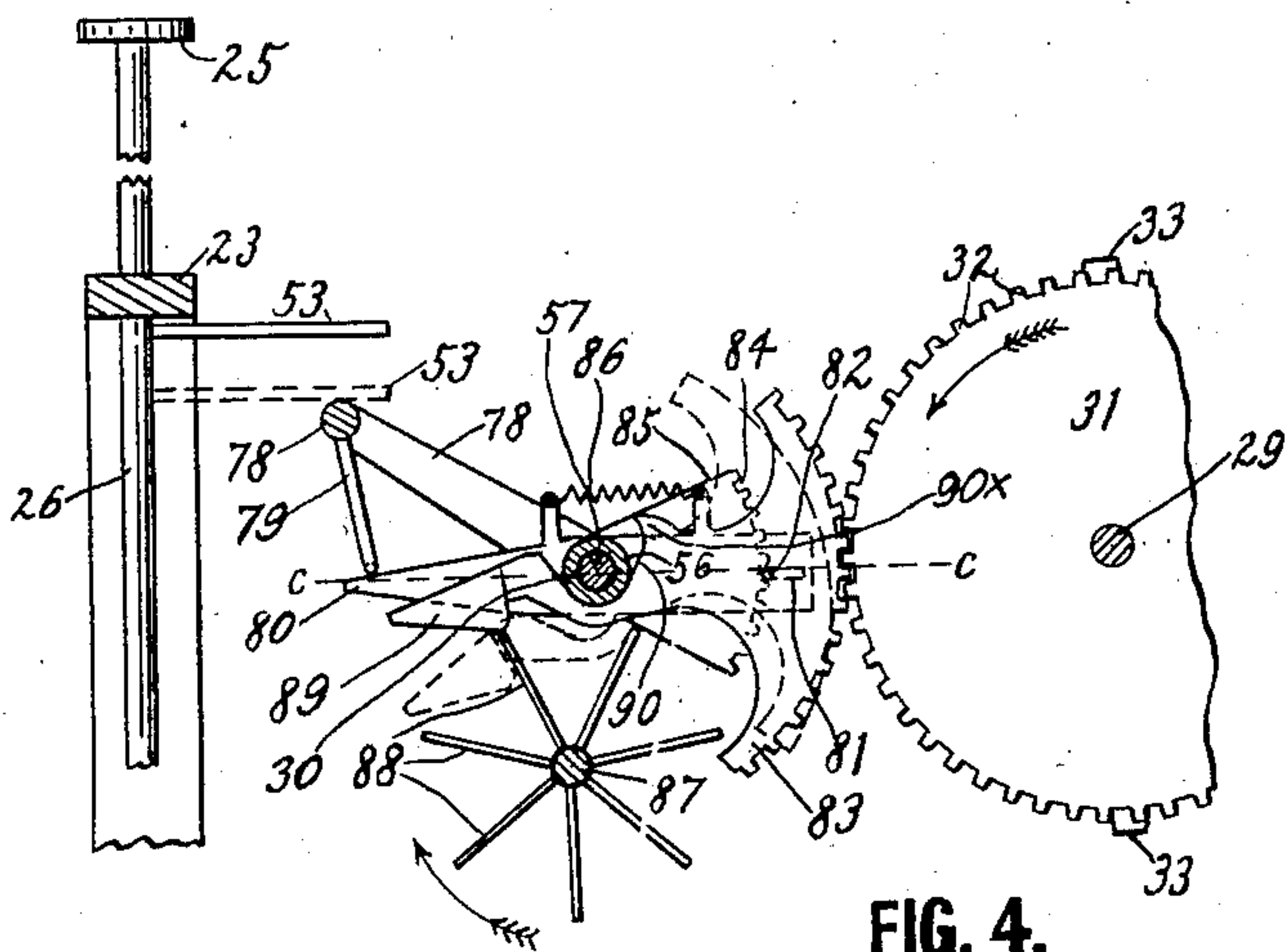


FIG. 4.

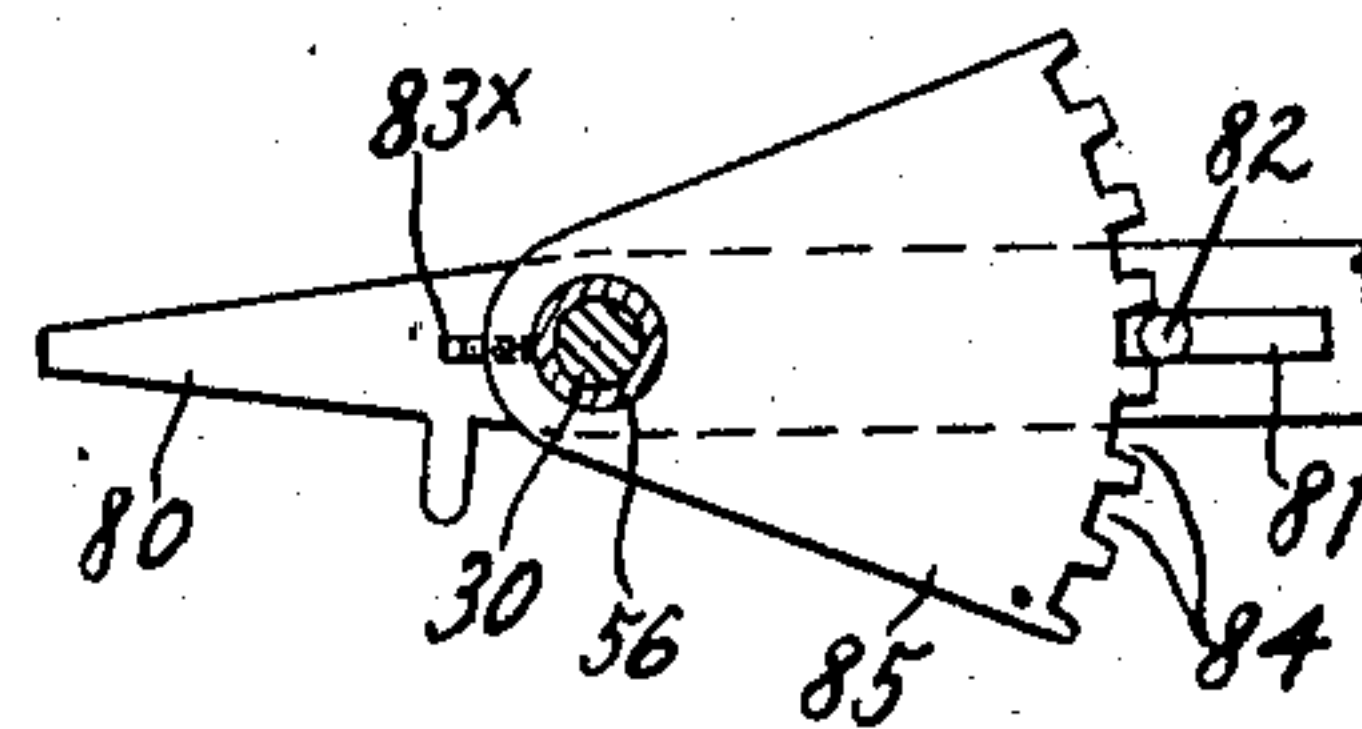


FIG. 7.

WITNESSES:

D. E. Carlson.
E. C. Carlson.

INVENTOR.

Ole Ostbye.

BY his ATTORNEY:

A. M. Carlson.

UNITED STATES PATENT OFFICE.

OLE OSTBYE, OF MINNEAPOLIS, MINNESOTA.

ADDING-MACHINE.

No. 908,124.

Specification of Letters Patent.

Patented Dec. 29, 1908.

Application filed July 12, 1906, Serial No. 325,748. Renewed June 15, 1908. Serial No. 438,592.

To all whom it may concern:

Be it known that I, OLE OSTBYE, a subject of the King of Norway, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Adding-Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to adding-machines, and the object is to provide an improved machine of said class.

In the accompanying drawings,—Figure 1 is a top or plan view of my improved adding-machine. Fig. 2 is a front elevation of the key frame, keys and base in Fig. 1. Fig. 3 is a right hand side elevation of Fig. 1 with the key frame and bars 71 and 78 intersected on line *a a* in Figs. 1 and 2. Fig. 4 is a sectional end view on the line *b b* in Fig. 1 with many parts omitted. Fig. 5 is a sectional view on the line *c c* in Fig. 4. Fig. 6 is a left hand end view of the stud 62 and spiral-edged cam 61 in Fig. 1, showing its interior arrangement. Fig. 7 is a rear elevation of some of the parts in Fig. 4.

Referring to the drawing by reference numerals, the frame may be of any suitable desired form, but in the present illustration it consists of a base board 12; and a number of posts 13, 14, 15, 16, 17, 18, 19, 20 and 21 and two brackets 22, 22^a, secured thereon. The posts 17—18 with their horizontal bars 23, 24 constitute the frame for the ten keys 25 to slide in with their long stems. Also the bars 27, 28, and the fixed shafts 29 and 30 may be considered as parts of the frame.

In the rear part of the frame is mounted to revolve on the shaft 29 any desired number of wheels 31, (in the present instance seven wheels are used). Each of said wheels is numbered upon its face with a series of numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, as many times as the circumference will permit, in the present instance the numbers are repeated four times on each wheel, and the wheel has one small tooth 32 for each single number or cipher, and also a large tooth 33 for each series of numbers, the large teeth being along one edge of the face of the wheel and the small teeth along the other edge.

As shown in Fig. 3, the wheels are held against accidental motion by spring dogs 34 secured on a horizontal frame bar 35 and resting with the curved end 36 between the small teeth, in a manner to yield when the wheel is turned by proper force.

Upon the frame arms 37 is secured a strip 38 having a slot 39 through which the numbers on the wheels are read. Whenever it is desired to have "0" on all the wheels appear in the slot, the key 40 is pressed down so that its bail 41, pivoted at 42 and having a broad dog 43 pressed by a spring 44, gathers by said dog, one large tooth 33 of each wheel into a straight line, which when the key 40 is fully pressed down will bring only naughts into the slot.

Above each wheel is pivotally suspended on the bar 28 an arm 45 carrying a pivoted dog 46 adapted to engage and move one of the small teeth forward when the lower end 47 of the arm is moved forward by one of the teeth 33 on the next wheel; said tooth 33 thereupon passes under and by the end 47 (see Fig. 3), and the arm 45 is at once by the spring 48 restored to its normal position, stopping against the pin 49 fixed in the bar 28 and projecting radially into a slot in the arm. This arrangement enables each wheel to move the next one and thus increase the next higher units as fast as the lower units accumulate sufficiently to call for it.

The mechanism by which the motion of the keys 25 is properly transmitted to the several wheels 31 is as follows: The keys 25 (see Figs. 2 and 3) are provided with springs 50 to hold them elevated with the pins 53 stopping under the bar 23, while on the key stems are screw-fastened collars 52 adapted to stop on the bar 24 when the key is depressed down in proportion to the digits marked on it, that is from "1" to "9" both inclusive; the key marked "0" has its collar still lower so that it will only operate, as hereafter explained, to select a wheel farther to the left but will not turn any of the wheels. 54 are key-ways in which guide pins 55 of the frame project to prevent turning of the keys. Upon the bar or fixed shaft 30 is slidingly mounted a sleeve 56, having a pin or key 57 sliding in a key way 58 in the bar. The sleeve 56 is held by a coil spring 59 against the spiral-shaped edge 60 of a cam 61, having an internal conic hub 61^x revolving on a stud 62 fixed in the post 19. As best shown in Fig. 6, said cam is normally held by the

spring 63 with its straight edge 64 resting against a pin 65 fixed in a collar 66, which is set-screwed on the stud and holds also one end of the springs 63, whose other end is secured at 67 to the cam. Against the resistance of the spring 63 the cam is gradually rotated forward, one turn, by having at its end a ratchet wheel 68, operated by a spring-pressed dog 69 and held by a similar dog 70 pivoted to the post 21. The dog 69 is carried by a bail 71, having its ends journaled on the shaft 30 and held by the spring 72, acting on its arm 73, normally elevated, until it is pressed down by one of the pawls 74, which is best shown in Fig. 3 to be pivoted at 75 to an arm 76 of the key stem, the latter having a spring 77 holding the pawl with the lower end in readiness to engage the bail 71 when descending and to yield and pass it in ascending; so that it will only move the wheel 68 one of its seven teeth forward each time the bail descends, and thus impart one-seventh of a revolution to the cam 61, so that the cam by its spiral edge 60, engaging the end of the sleeve 56 pushes the sleeve endwise on its shaft sufficiently to carry each of the toothed sectors 83, supported on the sleeve, as far as from one to another of the number wheels 31, the pawl 74 then passes by the bail 71, allowing it to return upward while the key stem goes farther down, to cause the pin 53 to press properly down another bail 78, which is mounted on the same shaft 30 and is held elevated by the spring 72^a. This latter bail has only one operating arm or finger 79, which swings down any one of the levers 80 previously moved below it by the action of the cam on the end of the sliding sleeve 56, as just described; for upon said sleeve 56, close by each sector lever 83, is journaled a lever 80, having a slot 81, through which extends from the toothed sector a pin 82, having a round side engaging partly in notches 84 of a notched quadrant 85, fixed on the sleeve by a set screw 83.

A spring 86 is fixed with one end to a stud on lever 80 and the other end to a stud at the upper edge of the toothed sector 83, so that the spring tends at all times to hold the sector away from the number-wheel, and to cause the pin 82 to act as a yielding dog or friction member upon the teeth 84, whereby the lever 80 and sector 83 will be held in any tilted position to which the finger 79 may have brought it, according to the height of the collar 52 and the corresponding number on the key 25 that was pressed down. If it was key "2" the lever arm 80 would only be depressed enough to bring the sector 83 two teeth upward so that when one of the arms 88 of shaft 87 passed by the wing 89 of that sector, the sector will be returned to its normal (lowest) position, and using tube 56 as a fulcrum will turn its number-wheel 31 forward only two teeth, and the same with

the other sectors according to the keys used, excepting key "0", whose collar 52 allows it only to descend enough to impart one-seventh of a turn to the cam 61, by means of the dog 74, as described, but the key cannot go far enough down for the arm 53 to reach the bail 78, by which the toothed sectors are moved upward the amount they are to act on the number wheels when they descend.

After the sectors are by the spiral cam moved to the left, in front of the wheels 31 to be turned, and the keys, pins 53, bail 78 and pin 79 have tilted the sectors 83 upward according to the sum pressed down at the keys, according to the ciphers marked on them, the sectors are moved forward into engagement with the small teeth of the wheels 31, and while so engaged they are tilted downward, thereby turning the wheels properly ahead, to produce in the reading slot 39 the amount pressed down on the keys, or a sum with said amount added to it. The spring 86 also helps the gravity and cam 9 to bring the winged arms 89 of the toothed sector down to its normal position, shown in dotted lines in Fig. 4, with the upper curve 90^x of the cam hanging on the tube 57. Such tilting motion to the sectors is caused by a single revolution of a shaft 87, which is shown in Figs. 1 and 4; it has seven spirally arranged radial arms 88, which in passing under the wings 89 of the sector arms tilt them upward and thereby the sectors downward, the first part of the upward motion of the arm or wing 89, caused the cam edge 90, of each sector operated, to glide on the side of sleeve 56 and thereby push the sector into mesh with the wheel 31, and to disengage the pin 82 from the quadrant 85. It may be stated here, in still further explanation, that when the shaft 8 (see Fig. 4) is given one revolution by the lever 96 and the gears described, all the radial arms 88 pass one by each sector lever 89, as many of them as the cam 61 has moved enough to the left to be over the radial arms, and if only key "0" was used, one or more times, there would appear only naughts in the reading slot, the same as before operation, because the radial arms 88 would only lift the sector levers with the cams or cam notches 90 up to the sleeve 56, and thereby cause the sectors to engage the number wheels, but they would at once recede to their normal positions without turning the wheels, since none of the pins 53 had acted on arm 80 and brought any of the wings or arms 89 low enough for the radial arms 88 to use the tube 56 as a fulcrum for the sector to turn a number wheel, as would be the case had any of the other keys been used, as above described.

Exactly one revolution of shaft 87, just described, is produced by a ratchet wheel 91 fixed on it and a loose gear wheel 92

at the side of the ratchet wheel and having a dog 93 engaging the ratchet wheel; said gear wheel is oscillated one turn each way by the toothed sector 94, pivoted at 95 and operated by the hand lever 96, which is held in normal position by a spring 97 and a stop 98. The moment the sector 94 descends into the pit 99, or any other stopping point, its pin 100 presses down the trip lever 101 so that its swinging front end presses on the pins 102—103 of the dogs 69 and 70, which are thereby disengaged from the ratchet wheel 68, and the spring 63 returns it, and the cam 61 fixed to it, to normal position. 104 is a brake pinching over the shaft 87 to prevent accidental turning of it. The brake consists of two spring-arms secured upon the post 20 and having a tension screw 105 adapted to close the curved portions of the arms more or less tightly upon opposite sides of the shaft.

In the use of the machine, if for instance there is to be added together 146, 279 and 1205, the operator will for the first item press down in succession the keys 6, 4 and 1, or in the reverse order, 1, 4 and 6, the direction makes no difference as it is only to prepare for motion of the wheels, he then pulls forward the lever 96, whereby the item becomes visible through the slot 39. He then presses down keys 9, 7 and 2, and as he pulls the lever 96 the sum of the first and second item will appear in the slot; for the third item he presses down keys 5, 0, 2 and 1, and after using lever 96 the sum of the three items will appear in the slot, the carried numbers from one wheel to another having been taken care of by the large teeth 3 and arms or pendants 45 operated thereby. When the whole column is added, the sum in the slot is recorded by writing, and the machine is set right for another column by pressing down the keys 40, which brings only a line of naughts into the slot 39.

Having thus described the invention and its operation, what I claim, and desire to secure by Letters Patent, is:—

1. In an adding-machine, a row of keys arranged across the front of the machine and bearing the successive numbers "0" to "9" a series of indicator wheels mounted to revolve on a horizontal shaft farther back in the machine, said wheels having each peripherically arranged upon its face one or more series of the numerals "0" to "9" and at one side thereof a small tooth or notch for each numeral and at the other side a large tooth for each figure "0" on the wheel, spring dogs engaging the small teeth to prevent accidental turning of the wheel, a series of pivoted depending arms adapted to be engaged by the large teeth, a dog pivoted on each of said arms and adapted to engage and move one of the small teeth of the next wheel when the

large tooth on the adjacent wheel swings the arm in passing it, and selecting means whereby the keys are caused to turn any of the wheels more or less according to the numeral on the key, a swinging bail and a key operating the same, a broad-faced pawl or dog carried by the bail and adapted when the bail is swung to engage and move one large tooth of each wheel into a straight line and thereby bring only naughts to appear at the line or place where the wheels are read.

2. In an adding-machine, a row of keys arranged across the front of the machine and bearing the successive numbers "0" to "9" a series of indicator wheels mounted to revolve on a horizontal shaft farther back in the machine said wheels having each peripherically arranged upon its face one or more series of the numerals "0" to "9" and at one side thereof a small tooth or notch for each numeral and at the other side a large tooth for each figure "0" on the wheel, spring dogs engaging the small teeth to prevent accidental turning of the wheel, a series of pivoted depending arms adapted to be engaged by the large teeth, a dog pivoted on each of said arms and adapted to engage and move one of the small teeth of the next wheel when the large tooth on the adjacent wheel swings the arm in passing it, and selecting means whereby the keys are caused to turn any of the wheels more or less according to the numeral on the key; said selecting means consisting of a horizontal shaft, a non-revoluble sleeve sliding thereon, a spring normally sliding the sleeve in one direction, an oscillating spiral cam moving the sleeve in the opposite direction against the spring, a ratchet wheel on the cam, a swinging spring-raised bail, a dog carried thereby and turning the ratchet wheel, a spring tending to return the cam to its normal position, a dog engaging the ratchet wheel to hold it and the cam against the action of said spring, a dog carried by each key and engaging said bail enough to move one tooth of the ratchet wheel and then pass the bail, said dogs being adapted to yield and pass the bail when they touch it as they ascend; a series of toothed quadrants or sectors, fixed on the sliding sleeve, and adjacent to each quadrant a tilting lever on the sleeve; said lever having a longitudinal slot, an oscillating toothed sector adapted to engage the small teeth of an indicator wheel to turn it and then recede from it, said sector having a pin extending through the slot of the lever to engage the fixed sector, and a forwardly extending arm, a spring tending to draw the sector away from the indicator wheel, and the said pin into holding contact with the fixed sector, said sector arm having a cam

edge, 90, adapted when the arm is raised to glide across the sleeve and push the sector into meshing contact with the indicator wheel, a second swinging spring-elevated bail, the same having a single tooth adapted to engage and swing the lever moved directly below it by the spiral cam, arms extending from all of the keys "1" to "9" and adapted to swing said second bail and thereby regulating each sector into proper position for operation of the indicator wheel, a hand lever and other suitable means for tilting all the regulated sectors by a single stroke of the hand lever, and means actuated by the motion of the hand lever for disengaging the dogs and let the spiral cam return to normal position.

3. An adding machine having a series of toothed indicator wheels revolubly mounted on a shaft, a series of keys numbered "0" to "9", a series of tilting toothed sectors adapted to engage and rotate the indicator wheels, means whereby the motion of the keys select and move the sectors into line with the wheels they are to turn, means for setting the sectors in one direction as much as they are to tilt in the opposite direction to rotate the wheels in accordance with the number on the key applied, a rotary shaft having spirally arranged radial arms adapted, when the shaft makes one revolution, to throw all the selected sectors into contact with the indicator wheels, and tilt the sectors so as to turn the wheels one after the other in successive order, and means for imparting one revolution to said armed shaft.

4. An adding machine having a series of toothed indicator-wheels revolubly mounted on a shaft, a series of keys numbered "0" to "9", a series of tilting toothed sectors adapted to engage and rotate the indicator wheels, means whereby the motion of the keys select and move the sectors into line with the wheels they are to turn, means for setting the sec-

tors in one direction as much as they are to tilt in the opposite direction to rotate the wheels, in accordance with the number on the key applied, a rotary shaft having spirally arranged radial arms adapted, when the shaft makes one revolution, to throw all the selected sectors into contact with the indicator wheels and tilt the sectors so as to turn the wheels one after the other in successive order, and means for imparting one revolution to said armed shaft, the latter means comprising a gear wheel revoluble on the armed shaft, a dog carried thereby, a ratchet wheel fixed on the shaft and turned by the dog, a toothed sector pivoted in the frame work and engaging the gear wheel, a spring-retracted hand-lever fixed on the sector, and means for holding the armed shaft against accidental motion.

5. An adding machine having a series of keys with the numerals "0" to "9" marked upon them, a series of numbered indicator-wheels a slotted strip through which to see the numerals to be read, a series of tilting members movable in over the faces of said wheels, and adapted to engage and turn the wheels when tilted, a cam turned by the first part of the stroke of any key and engaging the series of tilting members to move it, means by which the keys "1" to "9" during the balance of their strokes regulate the tilting members into readiness for short or long tilting corresponding to the numeral on the keys operated, means for tilting said tilting members by a single motion of a lever, and means for restoring the series of tilting members and the cam to normal position.

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

OLE OSTBYE.

Witnesses:

A. M. CARLSEN,
JAMES E. TRASK.