

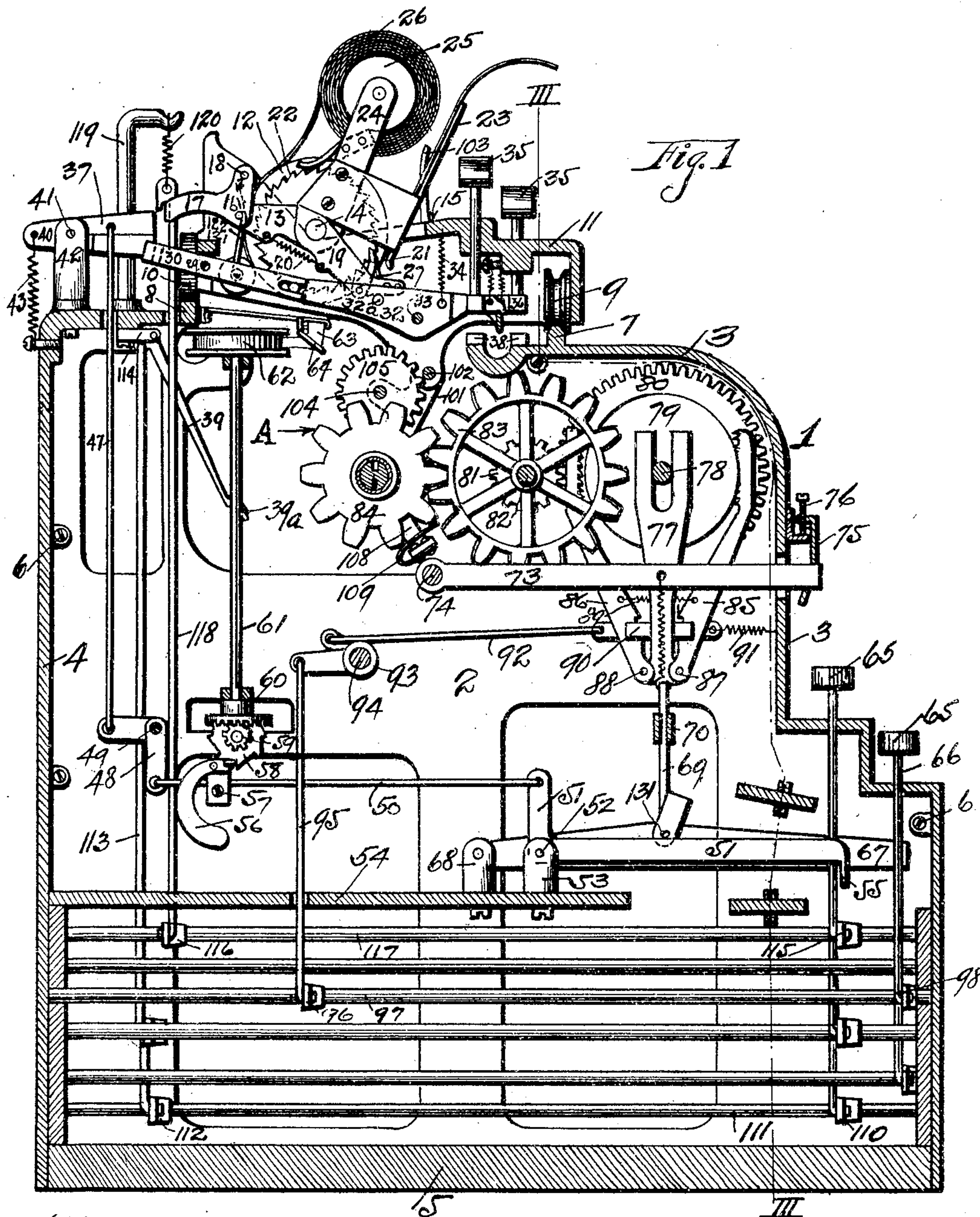
No. 808,696.

PATENTED JAN. 2, 1906.

W. F. SMITH.
ADDING MACHINE.

APPLICATION FILED NOV. 14, 1903.

7 SHEETS—SHEET 1.



Witnesses
Chas. Dunlap
J. D. Harvey

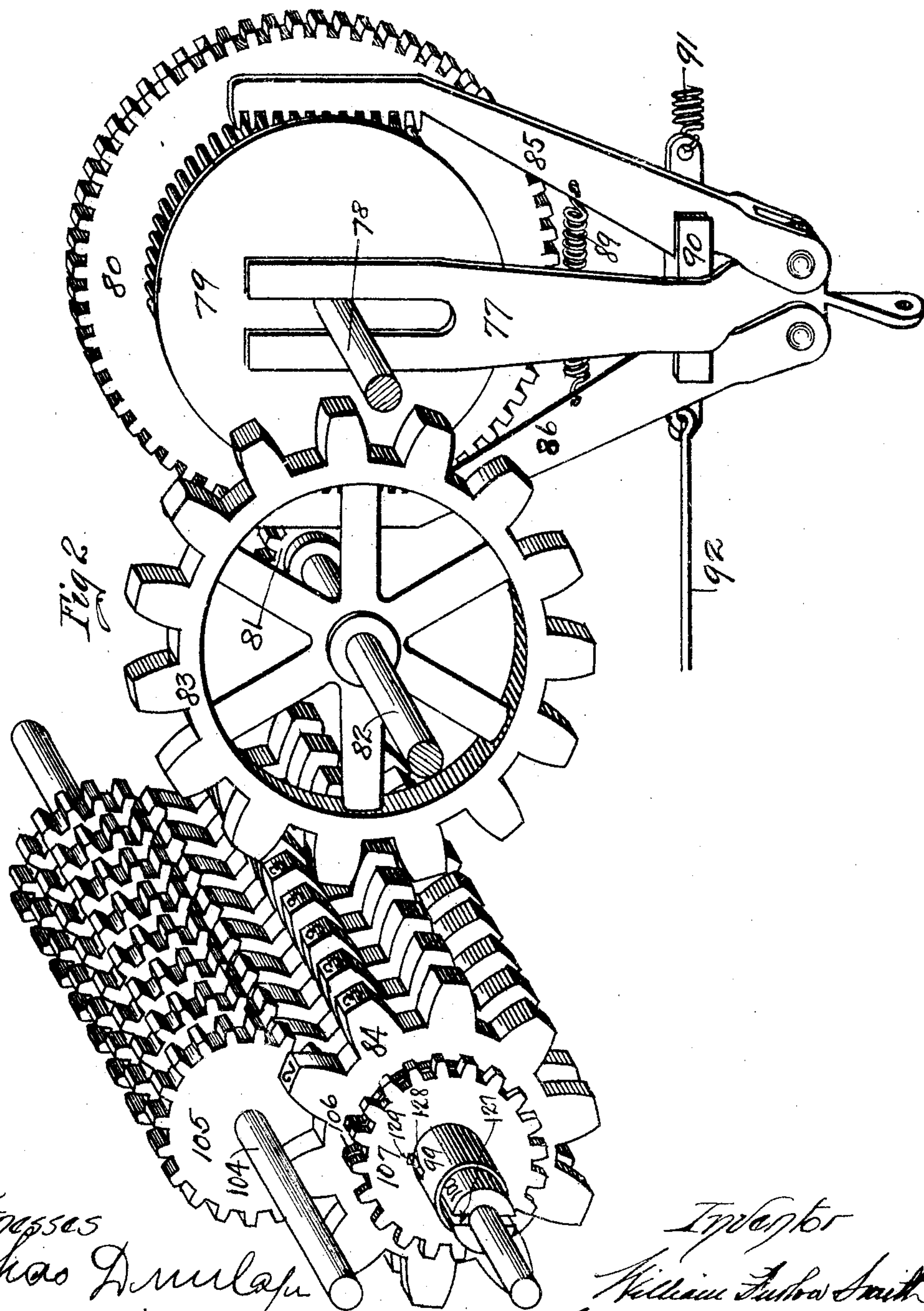
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7 SHEETS—SHEET 2.



Witnesses
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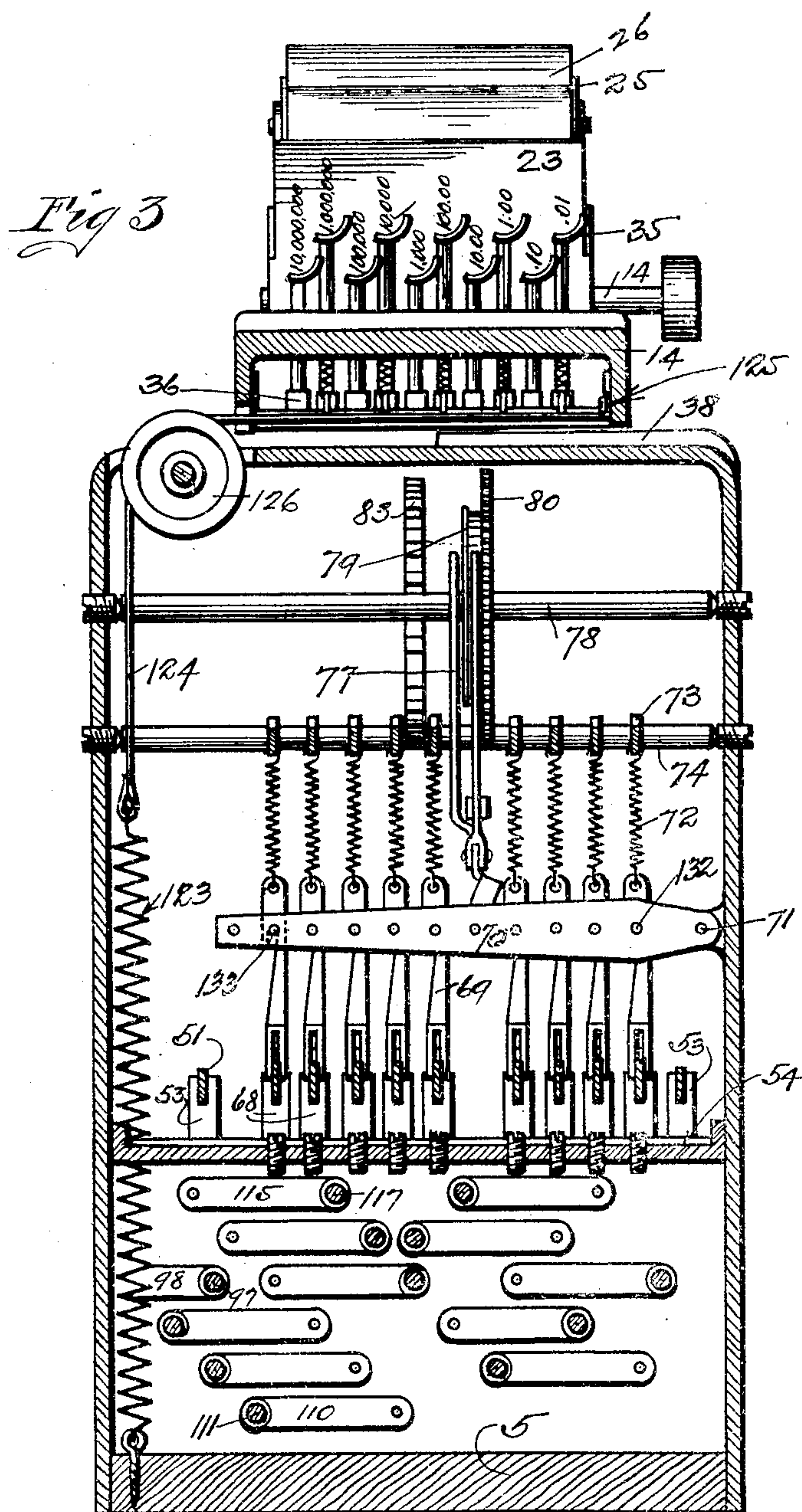
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7 SHEETS—SHEET 3.



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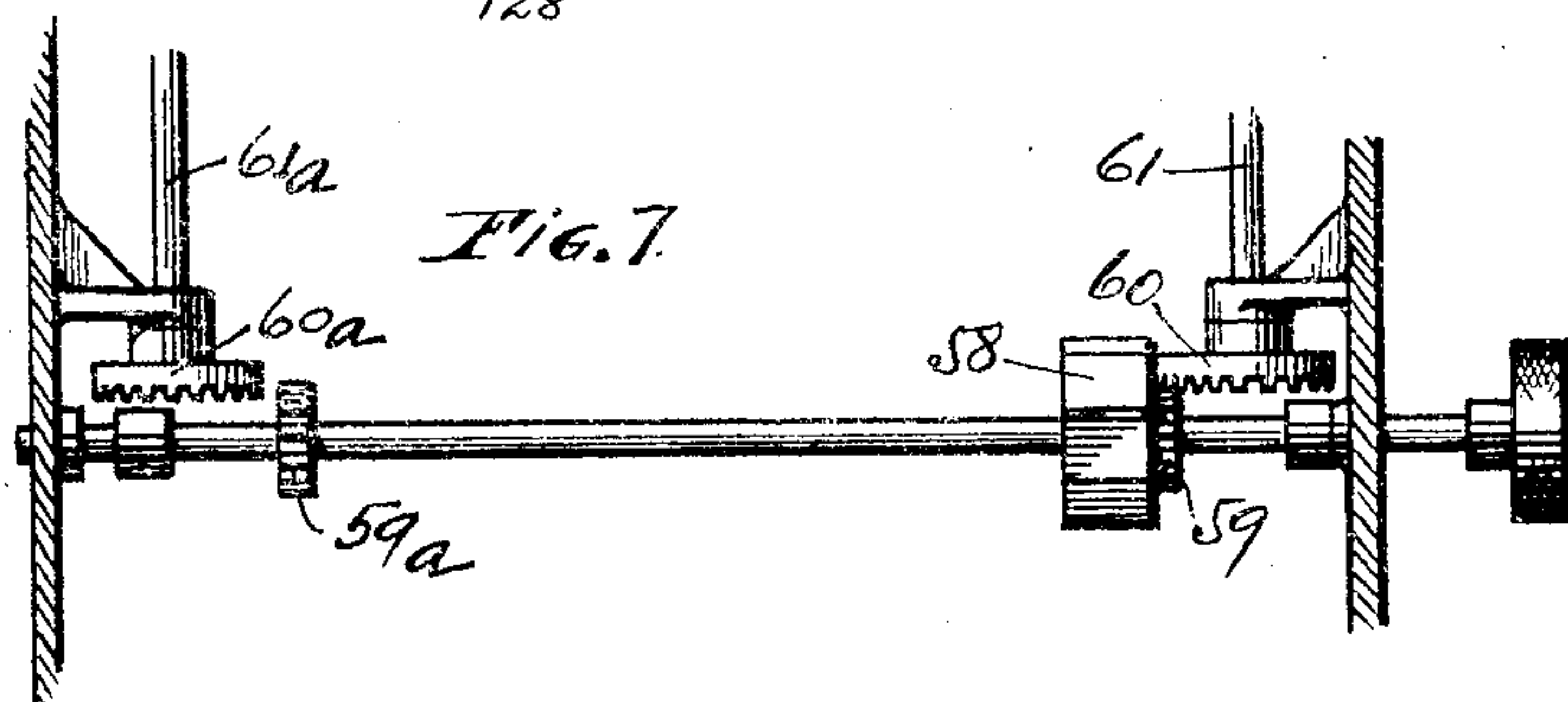
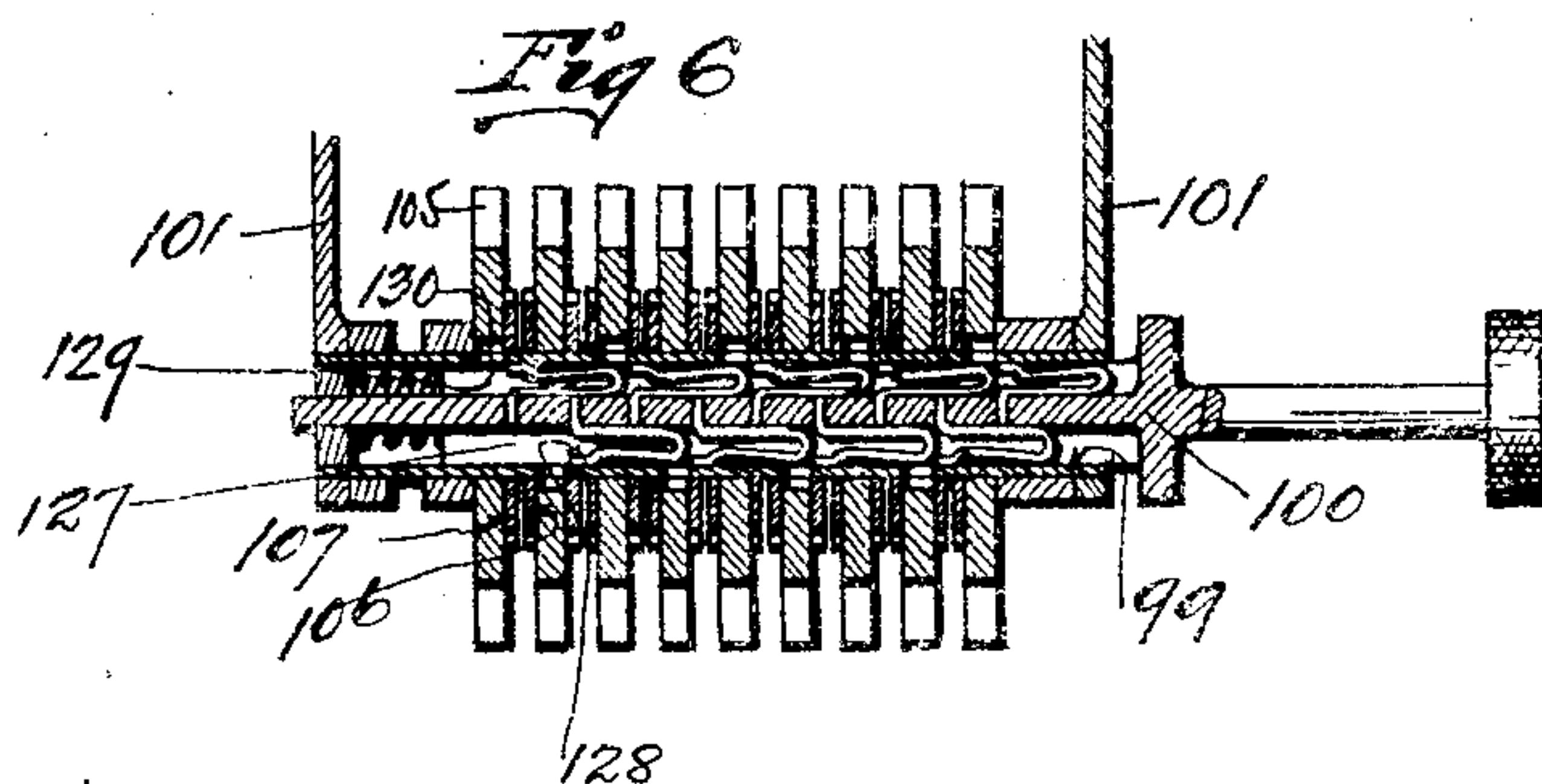
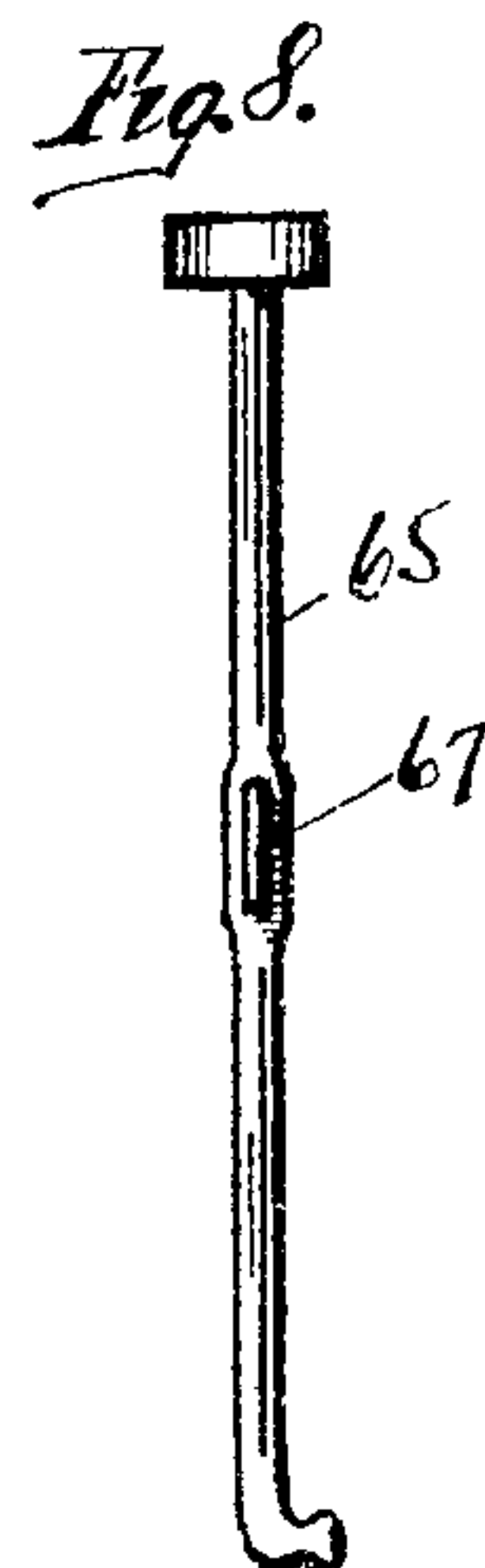
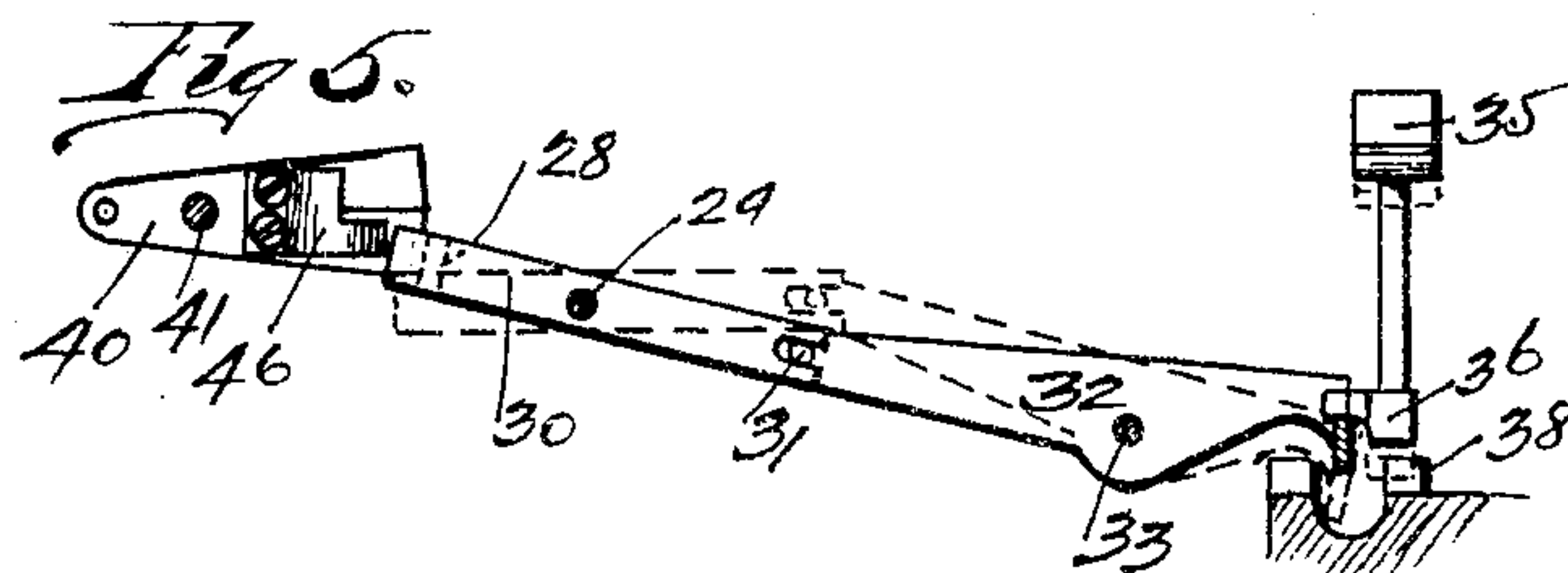
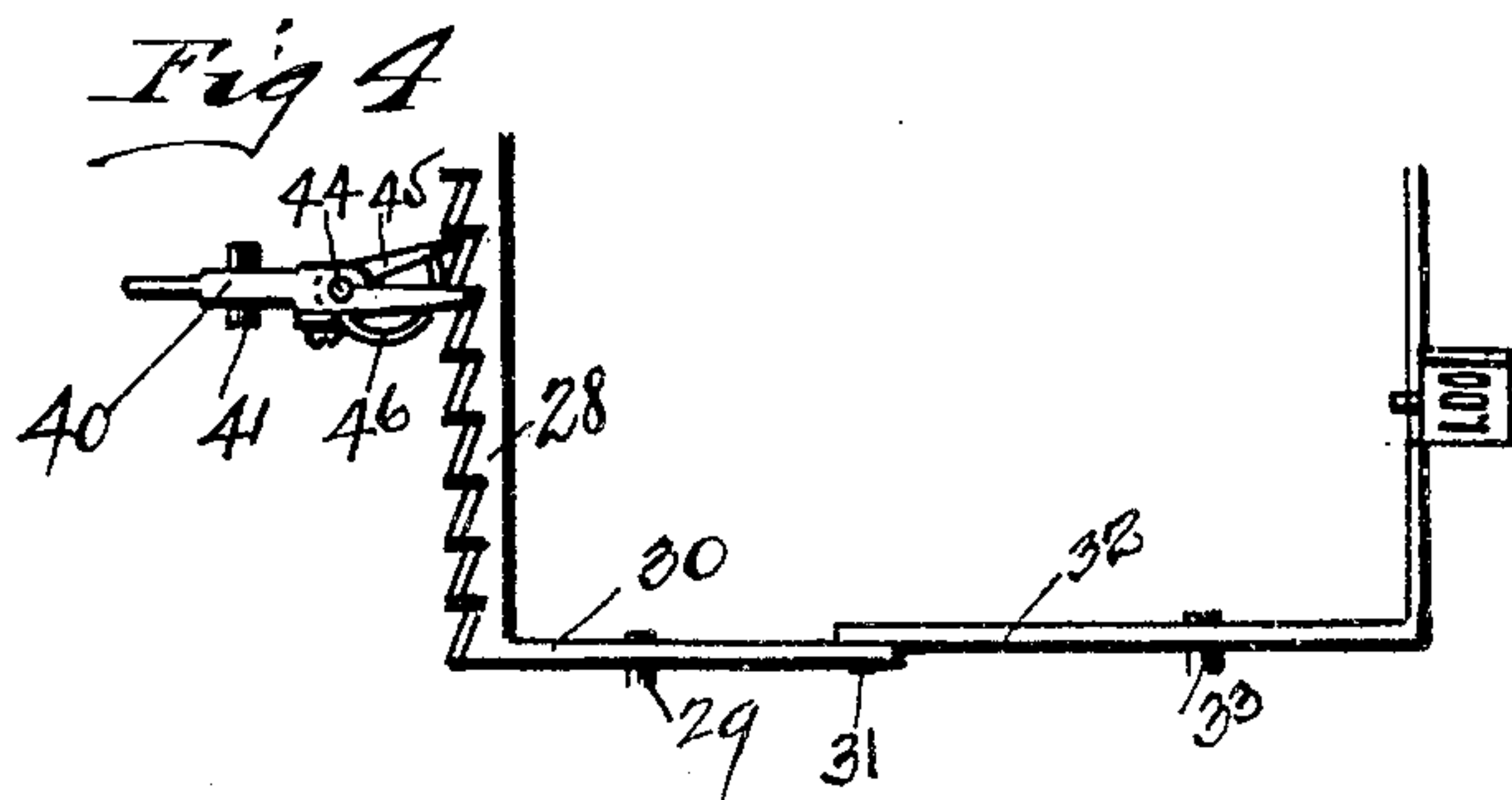
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7 SHEETS—SHEET 4.



Witnesses
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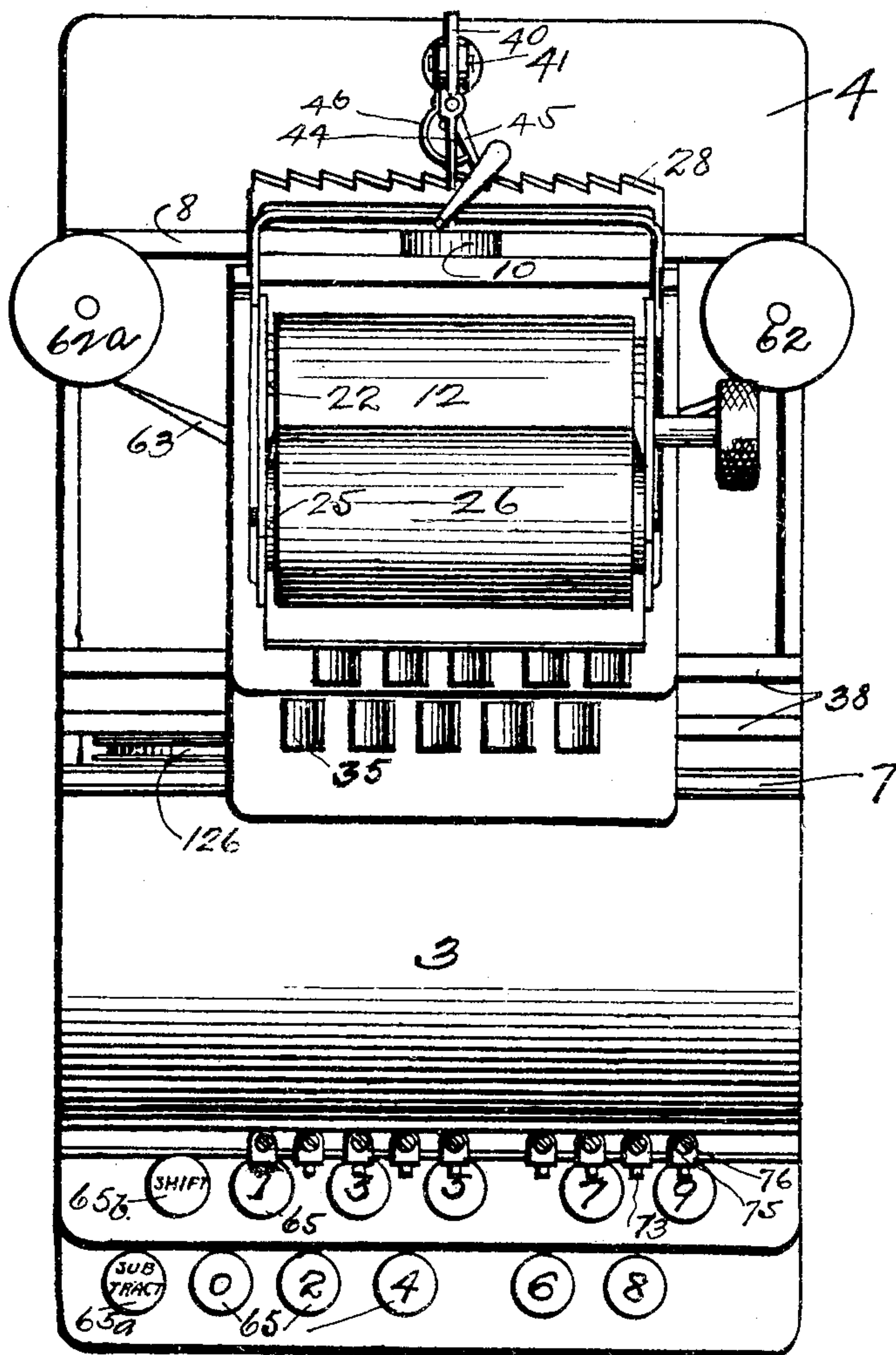
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7 SHEETS—SHEET 5.

Fig 9



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7 SHEETS—SHEET 6.

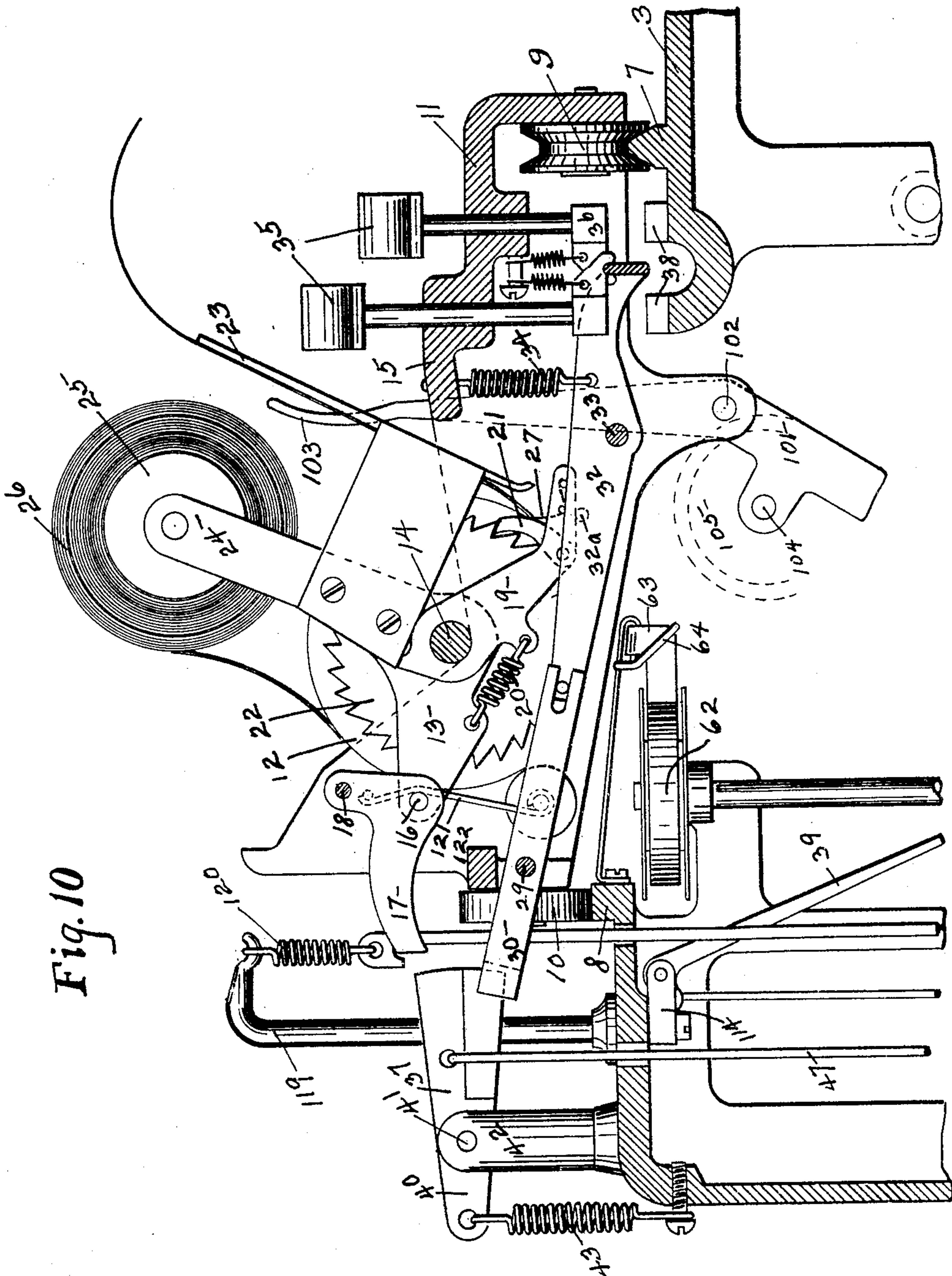


Fig. 10

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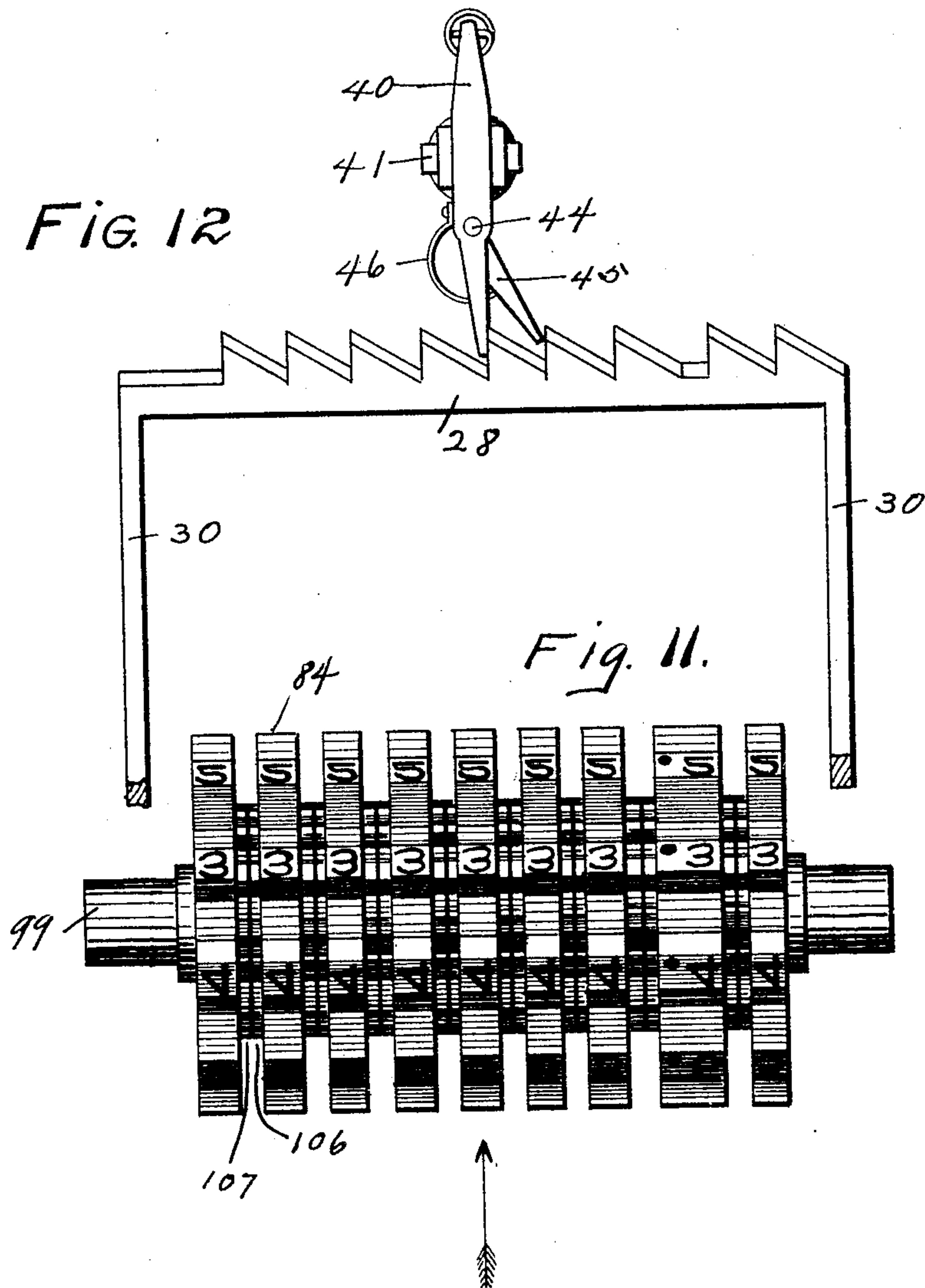
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APPLICATION FILED NOV. 14, 1903.

7 SHEETS—SHEET 7.

FIG. 12



WITNESSES
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UNITED STATES PATENT OFFICE.

WILLIAM FURLOW SMITH, OF JACKSON, MISSISSIPPI, ASSIGNOR OF ONE-HALF TO ARTHUR CECIL JONES, OF JACKSON, MISSISSIPPI.

ADDING-MACHINE.

No. 808,696.

Specification of Letters Patent.

Patented Jan. 2, 1906.

Application filed November 14, 1903. Serial No. 181,207.

To all whom it may concern:

Be it known that I, WILLIAM FURLOW SMITH, a citizen of the United States, residing at Jackson, Hinds county, State of Mississippi, have invented certain new and useful Improvements in Adding-Machines, of which the following is a specification.

My invention relates to certain new and useful improvements in adding-machines.

The objects of my invention are, first, to provide simple and efficient means whereby any number or combination of numbers may be recorded on a tabulating-strip and the summation of these amounts be carried by totaling-wheels and recorded on the tabulating-strip when desired; second, to provide means whereby any number or combination of numbers which may have been written may be erased from the tabulating-strip and at the same time may be deducted from the amount carried by the totaling-wheels; third, to provide an adding and tabulating machine having a minimum number of parts; fourth, to provide means of deducting any number or combination of numbers either with or without placing these numbers on the tabulating-strip, and generally in improving and perfecting the details of a machine for carrying out these objects. I accomplish these objects as will be fully set out in the drawings, specification, and claims.

In the drawings, Figure 1 is a sectional side elevation of my improved adding-machine, showing the number-keys, the totaling-wheels, and one type-bar only as illustrating the necessary ten type-bars which must be used to give a complete record. Fig. 2 is an enlarged oblique projection of the gears and racks comprising the totaling portion of the machine. Fig. 3 is a sectional front elevation of the machine, taken on the line III III of Fig. 1, but with the totaling-wheels and the type-bars omitted for purposes of clearness. Figs. 4 and 5 are a plan and side elevation, respectively, showing the carriage, the number-stop, and method of releasing the carriage to return it to any particular position. Fig. 6 is a sectional view of the number-wheels, showing method of picking up the wheels to return them to naught. Fig. 7 is a detail view of the ribbon-feed. Fig. 8 is a detail of the number-key. Fig. 9 is a plan view of the machine. Fig. 10 is an enlarged

side elevation of the carriage and platen. Fig. 11 is an enlarged front view of the number-wheels, showing the numerals on this wheel and the spacing between the dime and dollar wheel; and Fig. 12, a view showing the rack-spacing corresponding to the number-wheel spacing.

Referring now to the drawings, in which like numerals indicate the same or like parts in all the views, the machine comprises a frame 1, made up, preferably, of two sides 2, a front 3, back 4, and bottom 5, which are united together preferably by screws 6 passing through lugs on the front and back and fastening into the sides 2. Mounted on this frame is a V-shaped rail 7 and flat rear rail 8, on which run wheels 9 and 10, respectively, there being two wheels 9, one only of which appears in the drawings, which wheels 9 are grooved to fit the rail 7 and guide the carriage 11, in which the said wheels 9 and 10 are journaled. The carriage 11 carries a platen 12, which is journaled in side pieces 13, the ends of the platen-journal 14 extending beyond the side pieces and resting on the upper surface 15 on the carriage 11. These side pieces 13 extend backward and are pivoted at 16 in a yoke 17, which in turn is pivoted at 18 to the carriage 11.

19 represents arms pivoted on the journal 14 and held in place by springs 20, which connect them with the arms 13, one of the arms 13 carrying a pawl 21, engaging with the ratchet 22, integral with the platen 12, for advancing the platen at the beginning of a new line.

23 is a paper guide and shield which is fastened to the arms 13, extensions 24 of which arms carry a paper-reel 25, on which is shown a reel of paper or tabulating-strip 26.

27 is a spring holding the ratchet-pawl 21 into engagement with the ratchet-wheel 22.

28 is a spacing-rack (seen in detail in Figs. 4, 5, and 12) which is pivoted at 29 to the sides of the carriage 11. The opposite end of the arms 30, which carry this rack, are forked and engage a pin 31, carried by a loop-bar 32. This bar 32 is pivoted at 33 to the carriage 11 and is held in its normal position by the spring 34. As seen by reference to Figs. 4 and 12, this bar 32 is U-shaped in plan, extending across from side to side of the carriage. It will be noted that the rack corresponding with the space between the dollar and dime

wheels shown just below is larger than normal, and therefore allows for the extra space taken up by the decimal-point on the dime-wheel.

5 35 represents keys carrying stops 36 on their lower end, which stops depress the U-shaped bar 32 and throw the rack 30 out of engagement with the step-by-step mechanism 37, and by means of a pin 32^a, projecting
10 inward, operate the arm 19 and throw it and the ratchet-pawl 21 to rotate the platen 12. Coacting also with the stops 36 is a stop 38 on the frame of the machine, which limit the motion of the carriage. Referring especially to
15 Fig. 3, it will be noted from the figures shown immediately above each of these keys 35 that they are numbered for cents, dimes, dollars, tens, hundreds, thousands, &c. Now when
20 any one of these keys—as, for instance, the dollar-key—is depressed and the spacing-rack released the carriage can be moved back until the stop 36 on this particular key comes against the stop 38 on the carriage, at which
25 time the dollar-column on the tabulating-strip will be brought in line with the striking-point of the type-bars 39 and at the same time the dollar-wheel on the totaling device is brought into place, as will be more fully
30 hereinafter set forth. The step-by-step motion is effected by the step-by-step mechanism 36, which comprises an arm 40, pivoted at 41 in a post 42 on the frame 4 and held in its normal position by a spring 43. A vertical
35 pivot 44 extends downward through this bar 40 and carries a piece 45, which is normally held in position shown in Fig. 4 (*i. e.*, at an angle with the arm 40) by a spring 46, which is fastened to the said arm 40 and to the frame 4. A link 47 extends downward into the
40 center of the frame and is connected by means of a bell-crank lever 48, pivoted on a rod 49, extending from side frame to side frame. From this bell-crank lever a link 50 extends forward and is connected to a bell-crank lever 51, pivoted at 52 in a standard 53 to a
45 frame of the machine. At the front end these bell-crank levers 51 are connected by a cross-arm 55, which is operated by the depressing of the number-keys, as will be
50 more fully hereinafter described. The operation of the number-keys depressing this bell-crank lever 51 operates a ratchet-pawl 56, carried by the bracket 57, which is in turn carried by the link 50. The said ratchet 56,
55 acting with a ratchet-wheel 58 through a pinion 57 and a crown-gear 60, rotates a shaft 61, journaled in the side frame 2, which shaft carries the ribbon-spool 62.

60 63 is a ribbon, and 64 a guide to direct the motion of the ribbon after it leaves the spool 62 to bring it in place for the type to strike on.

It will be especially noted by reference to Fig. 7 that by shifting the ratchet-wheel 58
65 longitudinally the pinion 59^a is brought into

engagement with the crown-wheel 60^a, so that the ribbon-spool 62^a on the opposite side will be thrown into use and the direction of motion of the ribbon be thereby reversed.

65 represents the number-keys, which, as 70 will be seen by reference to Fig. 9, are numbered in a single set from "0" to "9," inclusive. Rods 66 extend downward from these keys, which rods are forked, as shown in Fig. 8, and embrace levers 67, which are pivoted 75 in the posts 68, carried by the plate 54. From each of these levers a link 69 extends upward and connects into a cross-bar 70, which bar is pivoted at 71 to one of the side frames 2. These links are held in their normal position by springs 72, each of which is fastened 80 at its upper end to individual tension-bars 73, all of which are carried at one of their ends by a shaft 74, extending from side to side of the frame of the machine. At the opposite 85 end each of these bars is carried by a bracket 75, having a tension-screw 76 to adjust it. From the bar 70 a link and guide 77 extend upward and is forked to embrace a shaft 78, which shaft carries a pin-gear 79, which is in- 90 tegral with a spur-gear 80, which spur-gear in turn meshes with a pinion 81 on a shaft 82, and which shaft also carries the master-gear 83. This master-gear meshes directly with number or totaling wheels 84. On the link 95 77 two racks 85 and 86 are pivoted at the points 87 and 88, respectively. These racks are connected by a spring 89, which tends to hold them together, and are held the proper distance apart by a space-block 90, which 100 block is connected by a spring 91 with the front 3 of the frame. From this space-block 90 a link 92 extends backward and is connected, by means of a bell-crank lever 93, mounted on a shaft 94, and a second link 95, 105 a rocker-arm 96, and rocker-shaft 97 and a rocker-arm 98, with the subtract-key 65^a. When, therefore, the key 65^a is depressed, the rack 85 is thrown into engagement with the pin-wheel 79, as shown in the drawings. 110 When this key is released, the opposite rack 86 is brought into engagement with the opposite side of the pin-wheel 79 and reverses the motion of same. As shown the rack 85 is in engagement and the action of the machine is 115 reversed. These racks 85 and 86 when thrown into engagement with the pin-wheel 79 are held in engagement only by a light spring 89. The upper surface of the teeth of these racks is beveled, as shown especially in Figs. 1 and 120 2, so that on the upward stroke of the rack the bevel of the teeth causes the spring 89 to give and allow the rack to slip on the pin-wheel 79. Thus on the downstroke that one of the racks which is in engagement with the 125 pin-wheel rotates the said pin-wheel, whereas on the upward stroke the rack slips on the pin-wheel and does not cause any motion of same.

The number-wheels 85 are mounted on a 130

hollow shaft 99, which in turn is mounted on a spindle 100, which is carried by arms 101, pivoted in opposite sides of the carriage 11 and keyed to a shaft 102, which is rotatably mounted in the said carriage 11. The arm 101 extends upward and is provided with a handle 103, the use of which will be hereinafter described. An extension 104 from the arms 101 carries gear-wheels 105, which mesh with other gear-wheels 106 and 107, keyed to the number-wheels 84.

Referring now especially to Fig. 2, in which it will be noted that the first number-wheel 84 and the first intermeshing gear 105 have been removed, the number-wheels 84 have each ten teeth, numbered from "0" to "9," inclusive, and these numbers are in raised figures on the ends of the teeth, the numerals "3" and one numeral "2" showing plainly in the figure. Beginning at the right-hand side of the figure, the number-wheels represent, respectively, cents, dimes, dollars, tens, hundreds, &c. It will be noted that the decimal-point between dollars and dimes is carried by the number-wheels themselves, being preferably carried, as shown, on the wheel representing dimes, the totaling-wheel representing tens of millions having been removed. Between each two number-wheels, as the millions and the tens of millions, (which has been removed to allow a clear view,) there are two gear-wheels 107 and 106. The gear-wheel 107 has twenty teeth or any multiple of ten, though preferably twenty, and is fastened to the tens-of-millions wheel. The gear-wheel 106 is of the same diameter and pitch as the wheel 107; but all the teeth, with the exception of two, (being one-tenth the total number,) have been removed. This wheel is fastened to the adjacent face of the million-wheel, which wheel in its turn carries on its opposite face (not shown) a gear similar to gear 107, and so on. The gears 105 are of practically double the thickness of the gear 106 and 107 and come between the number-wheels 84, meshing with the said gears 106 and 107. When, therefore, any totaling-wheel is rotated one complete revolution, the two teeth on the gear 106 advance the gear 105, and through this the wheel 107, meshing with it, is also advanced two teeth or one tenth its circumference, therefore advancing the totaling-wheel keyed to it one number.

The master-gear 83, before mentioned, is rotatably mounted in the frame of the machine. The totaling-wheels 84 are carried by the carriage moving on the frame of the machine. The master-wheel therefore engages successively with each of the totaling-wheels, and in this way a single master-wheel, and therefore a single bank of keys, operate successively tens of millions, millions, &c., to cents, inclusive. Depressing the number-key therefore actuates the particular total-

ing-wheel which is in engagement with the master-wheel at the time that the number-key is depressed, and when the subtract-key is depressed and the rack 85 thrown into engagement with the pin-wheel 79 the action is reversed, so that any number written in with such key depressed is subtracted from the total carried by the totaling-wheels. The master-wheel 83 has its teeth beveled at the edge, so that they come positively into engagement with the number-wheels, even though either may be slightly out of place.

108 is an arm extending out from the arm 101 and carrying a series of springs 109, which engage each the face of one of the totaling-wheels 84 to hold them in their proper positions.

Each of the number-keys 65 is connected by a rocker-shaft 111, a second rocker-arm 112, and a link 113 with one of the type-bars 139, which bars are pivoted in bearings 114, arranged in the usual circular arc around the inside of the frame 4. Each type-bar 39 is provided with a number, the whole ranging from "0" to "9," inclusive, and is also provided with a blank, as will be seen by reference to Fig. 9. The shift-key 65^b is connected, by means of rocker-arms 115 and 116, the rocker-shaft 117, and the link 118, with the U-bar 17. By depressing the shift-key 65^b the arms 17 are pulled downward and the pivot 16 is shifted forward around the center 18, moving the platen forward and bringing it in line with the blank space on the bar 39, so that any number or any key being depressed while this shift-key is depressed will be printed in solid blanks on the tabulating-strip.

119 is a post extending upward from the frame 4, carrying a spring 20, which supports the link 118.

121 is a roller which is held against the platen 12 by a spring 122, which roller holds the paper tight against the platen.

The carriage is moved by a spring 123 and a strap 124, attached to the inside of the carriage at a point 125.

The totaling-wheels, as before stated, are mounted on the hollow shaft 99, which in turn is mounted on a solid shaft 100. This shaft 100 is provided with slots 127, as shown in detail, Fig. 6, in which slot are springs 128, which are normally held depressed, as shown, by the solid portion of the hollow shaft 99. This shaft, however, is provided with slots 129 and is so mounted on the shaft 100 that the said shaft 100 may be shifted to bring the springs 128 beneath the slots 129. When this happens, the springs 128 project through the slots 129 and engage the keyways 130 in the totaling-wheels 84. When, therefore, the number has been written and the total printed on the recording-strip, as will be hereinafter described, the shaft 100 is slipped longitudinally and is rotated, the

springs 128 catch in the keyways 130 and bring all the totaling-wheels to their proper place. Since it is desirable that the number-keys 65 shall all be depressed the same amount, and since the bar 70 is at a fixed distance back from the front of the machine, the length of the key-bar from the point of attachment 131 in the link 69 to the pivot-point in the post 68 is varied as is necessary to secure the proper depression of the link 69. The link 69, as will be seen by reference to Fig. 3, comes at substantially proportionate distance from the fixed point 71 of the bar 77, so that this variation is only such as is necessary to adjust the slight error in proportion.

The pivot 132 represents the numeral "9," whereas the pivot 133 represents the numeral "1." "0" requiring no motion of the number-wheel is of course not connected with the bar 70.

The action of the machine is as follows: A roll of paper 26 having been placed in the machine and on the platen 12, the machine is ready for use. For example, it is required to write the amount "one thousand two hundred and fifty dollars and thirty-six cents. The stop 35, representing the thousand-column, is depressed and the carriage moved back until this stop comes against the stop 38 on the frame. Then the thousand-column on the tabulating-strip will be opposite the striking-point of the type-bars, and at the same time the totaling-wheel 84 representing the thousand-column will be in engagement with the master-wheel 83. The number-key 65 bearing the numeral "1" is then depressed, depressing the bar 67, the link 69, the bar 70, the rack 83, and rotating the pin-wheel 79, the gear 80, the pinion 81, the master-gear 83, and through it the totaling-wheel 84, which is rotated one space only. At the same time the type-bar 39 carrying the numeral "1" is by the mechanism hereinbefore described brought against the platen, and the numeral "1" is printed on the tabulating-strip in the thousand-column. At the same time the depression of the bar 67, acting through the bell-crank 51 and the connecting-links 47 and 50, depresses the step-by-step mechanism 36 and allows the carriage to move forward one space (as in the ordinary type-writer) to the hundred-column. This action brings the hundred-column on the tabulating-strips to the point of type action and moves the number-wheels 84 representing the hundred-column into engagement with the master-wheel 83. The numeral "2" being now depressed, the action is, as before described, on the number-wheel 84, except that the hundred-column is being acted on and that the number-wheel is rotated two teeth instead of one, the carriage being again advanced and the number printed on the tabulating-strip, as in the former case. It will be noted that

the movement of the carriage is effected by the release of the key, and therefore comes after the number has been printed and the totaling-wheel rotated. The numeral "5" is next depressed, rotating the number-wheel in the tens-column five spaces and printing the number "5" in the tens-column on the totaling-strip. The number "0," the number "3," and the number "6" are printed in like manner. During this time the carriage is moved to the left as is the ordinary type-writer and is now in its extreme left position. The column-stop key 35 corresponding with the column with which the next number begins is then depressed, releasing the rack and spacing the platen, and the carriage is moved back until the stop comes against the fixed stop, when the action is repeated, as before. It is of course not necessary to write any naughts in numbers ending in even cents, dollars, or hundreds unless it is desired; but if not written blank spaces are left. When all the desired amounts have been tabulated, the arm 103 is pulled forward and the totals on the totaling-wheels 84 are brought against the tabulating-strip on the platen 12. The arrow A in Fig. 1 represents the zero-point on the number-wheels 84 when they are in position to begin writing a number and also represents the point at which the totals are carried by these wheels. The number having been printed on the tabulating-strip, the spindle 100 is pushed to one side to release the springs 128 and is rotated to pick up the number-wheels and carry them back again to "0." When an amount has been written which is incorrect and it is desired to remove this amount from the totals, the subtract-key 65^a and the shift-key 65^b are both depressed and the amount which it is desired to remove (the platen having been turned to bring the line on which this amount is written again in place) is written in. The blanks on the type-bars blot out the amount, and the subtract-key having thrown in the subtract-rack 85 the amount written in is subtracted from the totals. Should it be desired to write in a credit, the subtract-key may be depressed and the number written in, in which case the number so written will appear in the written record exactly as any other would; but the amount of it would be subtracted from the total amount. If desired, of course, the ribbon 23 can be pulled down by hand and a piece of red carbon-paper can be used instead of the ribbon, in which case the numbers would appear written in red and the amount subtracted, which would be the more desirable way.

Having fully described my invention, what I claim, and desire to secure by Letters Patent in the United States, is—

1. In an adding-machine, the combination with a carriage, a platen mounted thereon

and type-bars with numerals thereon coacting with said platen, of arms pivotally mounted in said carriage, a plurality of totaling-wheels carried by said arms and adapted to
 5 be swung by said arms against said platen, and means for operating said type-bars and said totaling-wheels simultaneously, substantially as shown and described.

2. In an adding-machine, the combination
 10 with a carriage, a platen mounted thereon, and type-bars with numerals thereon coacting with said platen, of arms pivotally mounted in said carriage, a shaft carried by the free ends of said arms, a plurality of totaling-
 15 wheels mounted on said shaft and adapted to be swung by said arms against said platen and means for operating said type-bars and said totaling-wheels simultaneously, substantially as shown and described.

3. In an adding-machine, the combination
 20 with a carriage, a platen mounted thereon, and type-bars with numerals thereon coacting with said platen, of arms pivotally mounted in said carriage, a handle extending upward from one of said arms, a shaft carried
 25 by the free ends of said arms, a plurality of totaling-wheels mounted on said shaft and adapted to be swung by said arms against said platen, and means for operating said
 30 type-bars and said totaling-wheels simultaneously, substantially as shown and described.

4. In an adding-machine, the combination
 35 with a carriage, a platen mounted thereon and type-bars with numerals thereon coacting with said platen, of arms pivotally mounted in said carriage, a plurality of totaling-wheels carried by said arms and adapted to
 40 be swung by said arms against said platen, number-keys operating said type-bars, and gears connecting said number-keys and said totaling-wheels, substantially as shown and described.

5. In an adding-machine, the combination
 45 with a carriage, a platen mounted thereon, and type-bars with numerals thereon coacting with said platen, of arms pivotally mounted in said carriage, a plurality of totaling-wheels carried by said arms and adapted to
 50 be swung by said arms against said platen, a master-gear engaging each of said totaling-wheels successively as said carriage moves, and number-keys operating said type-bars and said master-gear, substantially as shown and described.

6. In an adding-machine, the combination
 55 with a carriage, a platen mounted thereon, and type-bars with numerals thereon coacting with said platen, of arms pivotally mounted in said carriage, a plurality of totaling-
 60 wheels carried by said arms and adapted to be swung by said arms against said platen, a master-gear engaging each of said totaling-wheels successively as said carriage moves, number-keys operating said type-bars, and
 65 means operated by said keys for rotating said

master-gear a predetermined amount and means for reversing the direction of rotation.

7. In an adding-machine, the combination
 70 with a carriage, a platen mounted thereon, and type-bars with numerals thereon coacting with said platen, of arms pivotally mounted in said carriage, a plurality of totaling-
 75 wheels carried by said arms and adapted to be swung by said arms against said platen, a master-gear engaging each of said totaling-wheels successively as said carriage moves, a shaft carrying said master-gear, a pinion on
 80 said shaft, a gear meshing with said pinion a shaft carrying said gear, a ratchet-wheel on said second shaft, oppositely-disposed racks, means for engaging either of said racks with,
 85 and for disengaging the other from said ratchet-wheel, number-keys operating said type-bars, and means operated by said number-keys for depressing said racks to operate said master-gear, substantially as described.

8. In an adding-machine, the combination
 90 with a carriage, a platen mounted on said carriage, arms pivoted to said carriage and a plurality of totaling-wheels carried by said arms, of a handle extending upward from
 95 one of said arms to swing same and bring said totaling-wheels against said platen.

9. In an adding-machine, the combination
 100 with a carriage, a platen mounted on said carriage, arms pivoted to said carriage, a plurality of totaling-wheels carried by said arms, and a handle extending upward from one of
 105 said arms to swing same and bring said totaling-wheels against said platen, of a master-gear mounted in a fixed frame and meshing directly with each of said totaling-wheels in
 110 succession as the carriage moves, substantially as described.

10. In an adding-machine, the combination
 115 with totaling-wheels carried in a movable frame, a master-wheel in mesh with said wheels, mounted on a shaft, a pinion fastened to said shaft, a driving-gear meshing with
 120 said pinion a shaft carrying said driving-gear, a pin-gear carried on said shaft, a rack engaging said gear and means of operating said rack.

11. In an adding-machine, the combination
 125 with totaling-wheels carried in a movable frame, a master-wheel in mesh with said wheels, mounted on a shaft in a fixed frame, a pinion fastened to said shaft, a driving-gear meshing with said pinion, a shaft carrying
 130 said driving-gear, a pin-gear carried on said shaft, a rack engaging said gear, a second rack and means of disengaging one rack and simultaneously engaging the other with the
 135 opposite face of said gear and means of depressing said racks a predetermined amount.

12. In an adding-machine, the combination
 140 with a set of totaling-wheels, a master-gear engaging said wheels successively, a shaft carrying said master-gear, a pinion mounted on said shaft, a driving-gear mesh-

ing with said pinion, a shaft carrying said driving-gear, a pin-wheel, a rack engaging said pin-wheel, a cross-arm pivoted at one end, a link depending from said rack and attached to said cross-arm near its center, a plurality of number-keys and levers operated thereby, arranged in numerical order and links connecting said levers with said cross-arm at proportionate distances from said pivoted end, whereby said rack is depressed proportionate amounts when said number-keys are depressed.

13. In an adding-machine, the combination with a plurality of totaling-wheels, of a master-gear engaging successively each of said totaling-wheels, means of moving said totaling-wheels to bring each successively into engagement with said master-wheel, a train of gearing actuating said master-gear, racks one of which is normally in engagement with said gearing and means of disengaging one rack and engaging the other to reverse the direction of motion.

14. In an adding-machine, the combination with totaling-wheels carried in a movable frame, a master-gear in mesh with said wheels and means of advancing said wheels to bring each successively into mesh with said master-wheel, of a ratchet-wheel, and gearing connecting said wheel with said master-wheel, oppositely-disposed racks and means of engaging either of said racks with said ratchet-wheel and of simultaneously disengaging the other of said racks, substantially as shown and described.

15. In an adding-machine, the combination with totaling-wheels carried in a movable frame, a master-gear in mesh with said wheels mounted in a fixed frame and means of advancing said totaling-wheels to bring each successively into mesh with said master-gear, gearing actuating said master-gear, racks, one of which normally engages said gearing and means of disengaging same and simultaneously engaging the other of said racks to reverse the direction of motion.

16. In an adding-machine, the combination with totaling-wheels carried in a movable frame, a master-gear in mesh with said wheels mounted on a shaft in a fixed frame, a pinion fastened to said shaft, a driving-gear meshing with said pinion, a shaft carrying said driving-gear, a pin-gear carried on said shaft, a forked link guided by said pin-gear shaft, a rack engaging said gear and carried by said link an oppositely-disposed rack carried by said link, a shift-key and a connection between said shift-key and said link.

17. In an adding-machine, the combination with totaling-wheels carried in a movable frame, a master-gear in mesh with said wheels mounted on a shaft in a fixed frame, a pinion fastened to said shaft, a driving-gear meshing with said pinion, a shaft carrying said driving-gear, a pin-gear carried on said

shaft, a forked link guided by said pin-gear shaft, a rack engaging said gear and carried by said link an oppositely-disposed rack carried by said link, a tension-spring connecting said racks, a space-bar, a shift-key, and levers and links connecting said shift-key and said space-bar with said racks.

18. In an adding-machine, the combination with totaling-wheels carried in a movable frame, a master-gear in mesh with said wheels mounted on a shaft in a fixed frame, a pinion fastened to said shaft, a driving-gear meshing with said pinion, a shaft carrying said driving-gear, a pin-gear carried on said shaft, a rack engaging said gear, a link connecting said rack with a cross-arm, a plurality of number-keys, a lever for each key and a link connecting each of said levers with said cross-arm.

19. In an adding-machine, the combination with a frame, number-keys mounted in said frame, key-rods extending downward therefrom, levers engaged by said rods, a U-shaped piece beneath said levers, a bell-crank lever on said U-piece, a second bell-crank lever a link connecting said bell-crank levers, a step-by-step mechanism, a link connecting said step-by-step mechanism to said bell-crank levers, a set of totaling-wheels and means of operating said wheels from said levers, of a set of type-bars mounted in said frame and a set of levers and rods connecting each of said bars with one of said key-rods.

20. In an adding-machine, the combination with a frame, number-keys mounted in said frame, key-rods extending downward therefrom, levers engaged by said rods, a U-shaped piece beneath said levers, a bell-crank lever on said U-piece, a second bell-crank lever, a link connecting said bell-crank levers, a ratchet-pawl on said link, a shaft mounted in said frame, a ratchet-wheel mounted on said shaft and engaged by said pawl, a pinion on said shaft, a crown-wheel in engagement therewith, a shaft extending upward therefrom, a ribbon-reel on said shaft, a step-by-step mechanism a link connecting said step-by-step mechanism and said bell-crank levers, a set of totaling-wheels, and means of operating said wheels from said levers, of a set of type-bars mounted in said frame and a set of levers and rods connecting each of said bars with one of said key-rods.

21. In an adding-machine, the combination with a frame, number-keys mounted in said frame, key-rods extending downward therefrom, levers engaged by said key-rods, a set of totaling-wheels, links and gearing connecting said wheels and said levers, bell-crank levers on opposite sides of said frame, a bar beneath said key-levers connecting said bell-crank levers, a second bell-crank lever, a link connecting said bell-crank levers, a pawl on said link, a ratchet-wheel engaged by said pawl, ribbon-spools and means operated by

said ratchet of operating said spools, of a set of type-bars mounted in said frame and a set of levers and rods connecting each of said bars with one of said key-rods.

5 22. In an adding-machine, the combination with a frame, number-keys mounted in said frame, key-rods extending downward therefrom, levers engaged by said key-rods, a set of totaling-wheels, and means of operating said wheels from said levers, a carriage on said frame, a platen mounted on said carriage, bell-crank levers pivoted to said carriage, a cross-bar connecting the ends of said bell-crank levers and links extending from
10 said bell-crank levers and embracing the ends of said platen, of a set of type-bars mounted in said frame, a set of levers and rods connecting each of said bars with one of said key-rods and means operated by said key-levers
15 of depressing the end of said bell-crank levers to shift the platen.
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23. In an adding-machine, the combination with a frame, number-keys mounted in said frame, key-rods extending downward therefrom, levers engaged by said key-rods, a cross-bar above said levers and pivoted in said frame, a link extending upward from

each of said levers and engaging said bar, a set of totaling-wheels, a master-gear meshing with said wheels, gearing driving said master-wheel, oppositely-disposed racks, one normally engaging said gearing and a link connecting said racks and said cross-levers, of a set of type-bars mounted in said frame and a set of levers and rods connecting each of said
30 bars with one of said key-rods.
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24. In combination in a calculating-machine, a series of number-wheels, a carrier therefor, a series of order-keys arranged on the carrier, means controlled by the operation
40 of the order-keys for shifting the carrier, a stop to be struck by the operated order-key to arrest the carrier with the appropriate number-wheel in proper position to be turned, digit-keys and connections therefrom to the
45 number-wheels for turning the same.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM FURLOW SMITH.

Witnesses:

A. C. JONES,

JAS. A. JONES, Jr.