

No. 771,505.

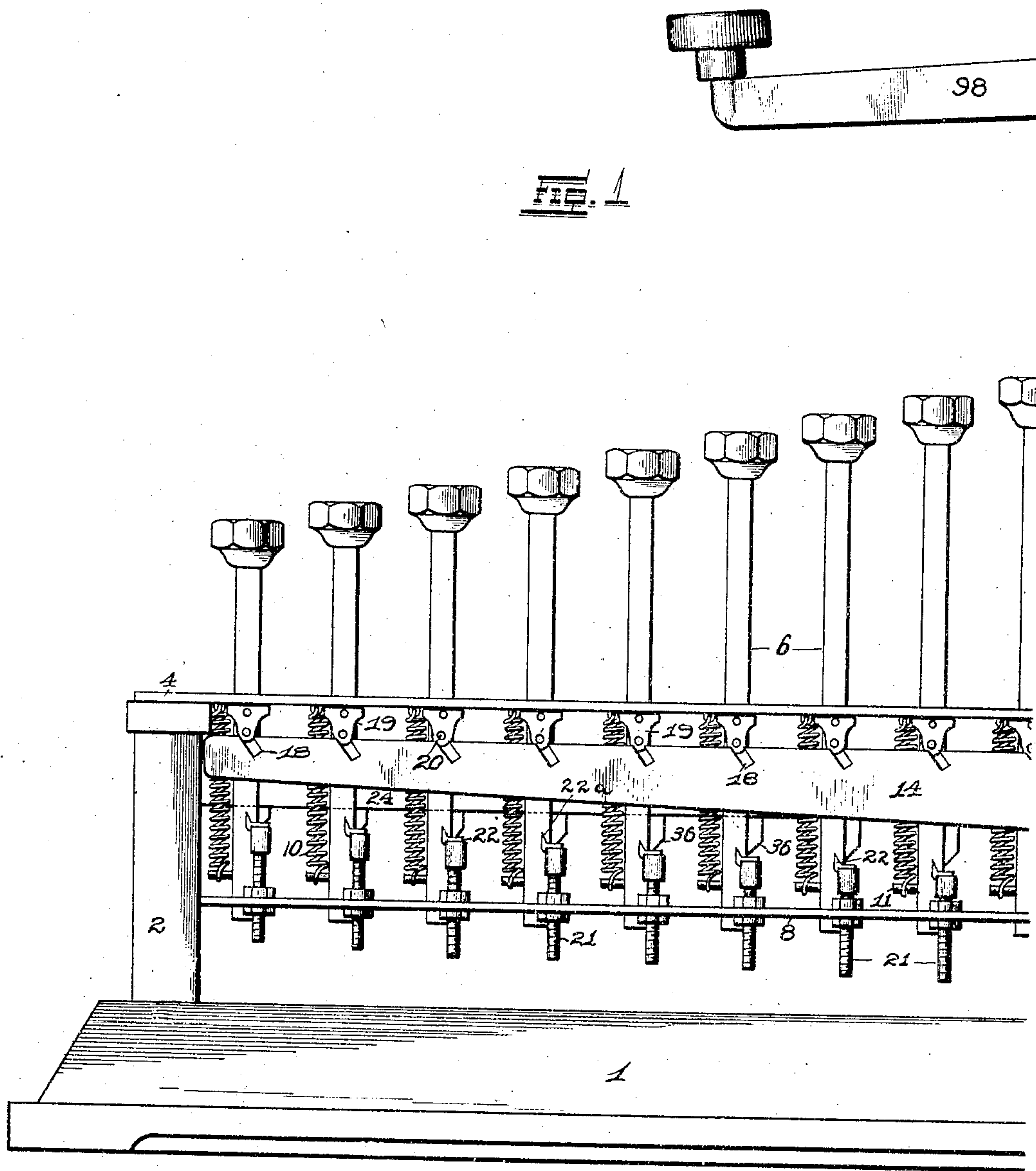
PATENTED OCT. 4, 1904.

C. STAHLBERG.
ADDING MACHINE.

APPLICATION FILED AUG. 13, 1900.

NO MODEL.

11 SHEETS—SHEET 1.



Witnesses

Alfred A. Eick
John D. Rippey

Inventor.

Chas. Stahlberg.

By Higdon & Longan, Attys.

No. 771,505.

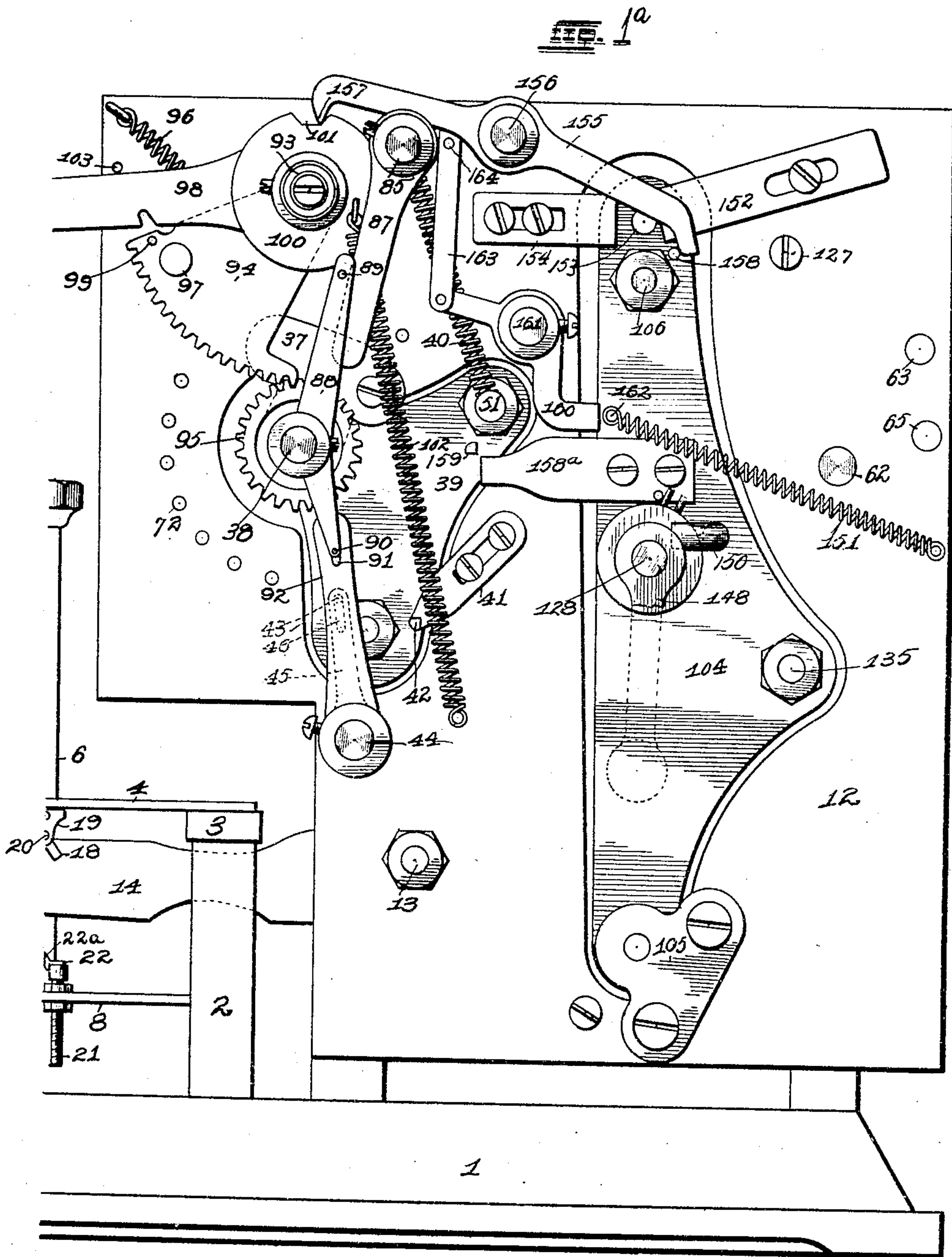
PATENTED OCT. 4, 1904.

C. STAHLBERG.
ADDING MACHINE.

NO. MODEL.

APPLICATION FILED AUG. 13, 1900.

11 SHEETS—SHEET 2.



No. 771,505.

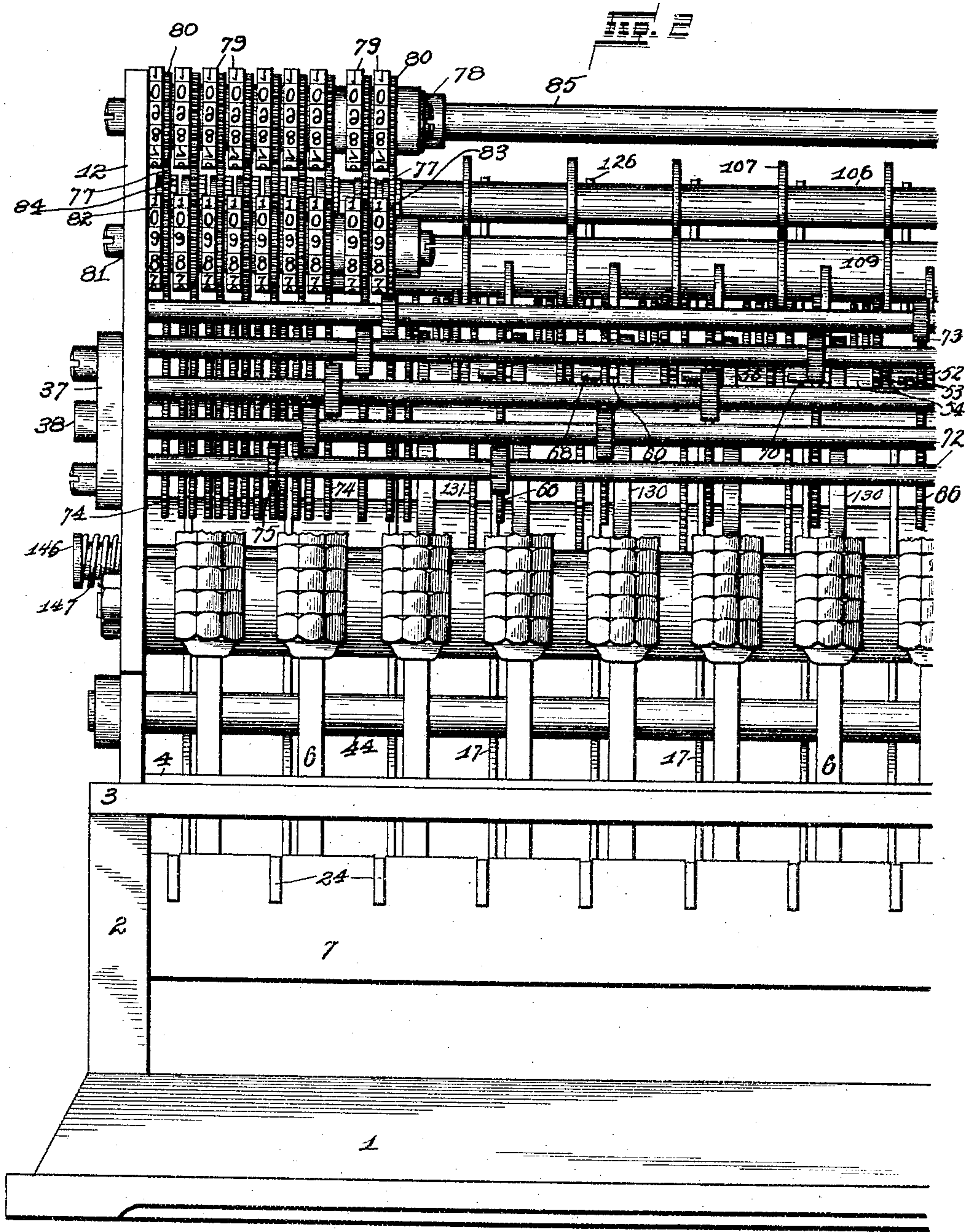
PATENTED OCT. 4, 1904.

C. STAHLBERG.
ADDING MACHINE.

NO MODEL.

APPLICATION FILED AUG. 13, 1900.

11 SHEETS—SHEET 3.



Witnesses

Alfred A. Eick
John D. Rippey

Inventor.

Chas. Stahlberg
By Sigdon & Longan, Attys.

No. 771,505.

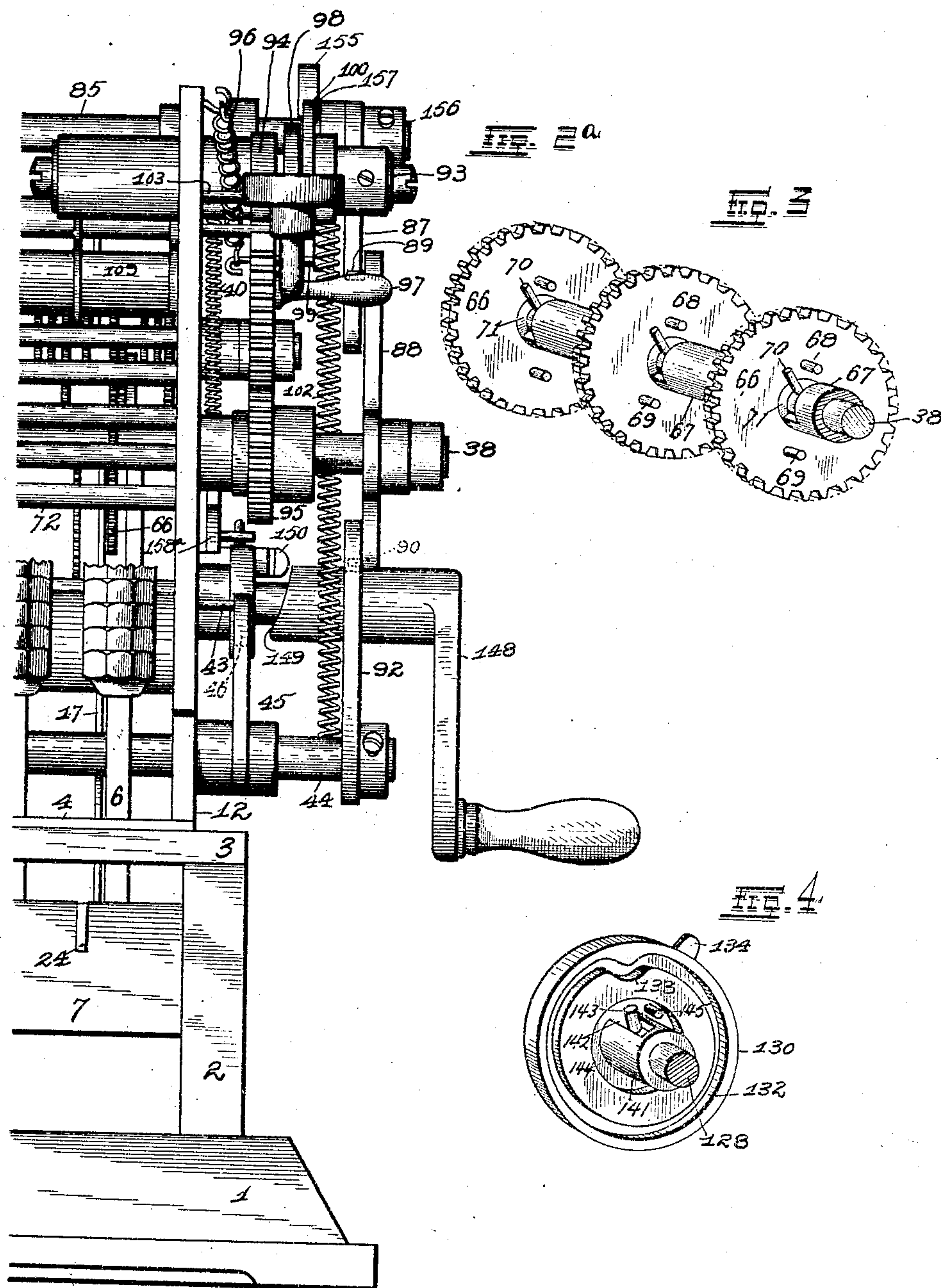
PATENTED OCT. 4, 1904.

C. STAHLBERG.
ADDING MACHINE.

NO MODEL.

APPLICATION FILED AUG. 13, 1900.

11 SHEETS—SHEET 4.



Witness
Alfred A. Eick
John D. Rupp

Inventor.
Chas Stahlberg
By Higdon & Longan, Attys.

No. 771,505.

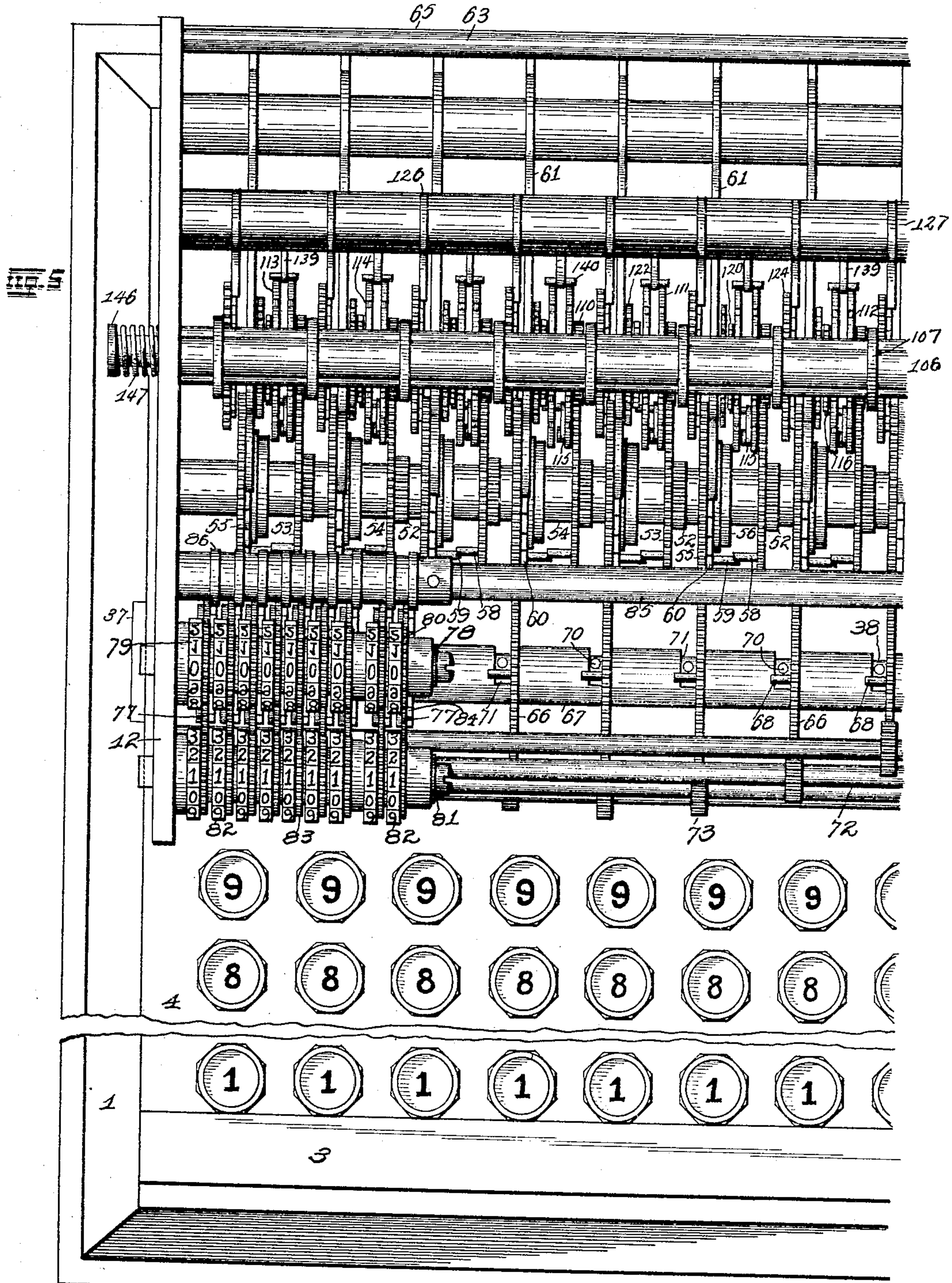
PATENTED OCT. 4, 1904.

C. STAHLBERG.
ADDING MACHINE.

NO MODEL.

APPLICATION FILED AUG. 13, 1900.

11 SHEETS—SHEET 9.



Witnesses
Alfred A. Eicher
John D. Rippey

Inventor
Chas. Stahlberg.
By Higdon & Longan, Attys

No. 771,505.

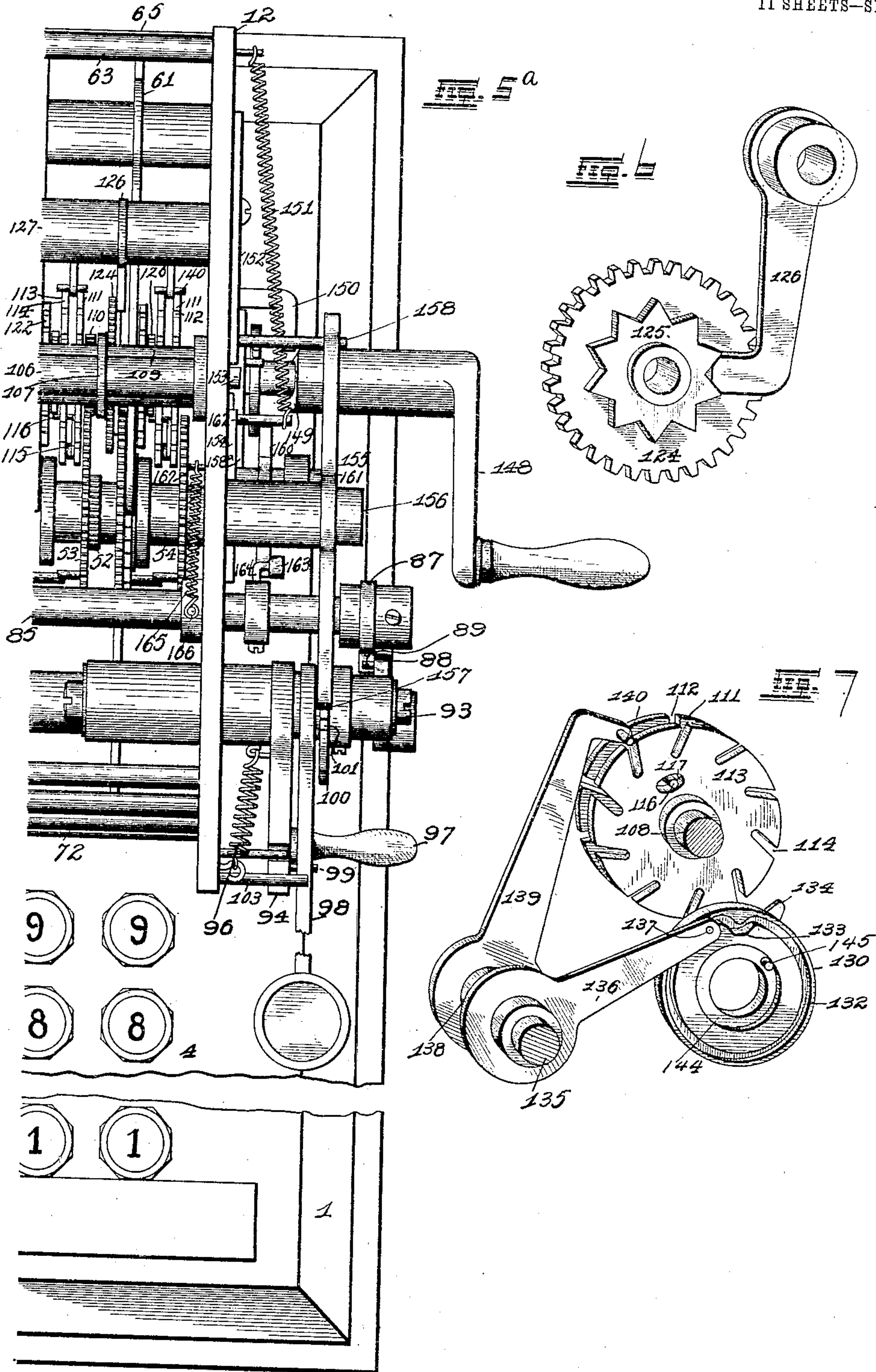
PATENTED OCT. 4, 1904.

C. STAHLBERG.
ADDING MACHINE.

NO MODEL.

APPLICATION FILED AUG. 13, 1900.

11 SHEETS—SHEET 6.



Witnesses
Alfred O. Eicher
John D. Rippey

Inventor.
Chas. Stahlberg.
By Higdon & Longan, Attys.

No. 771,505.

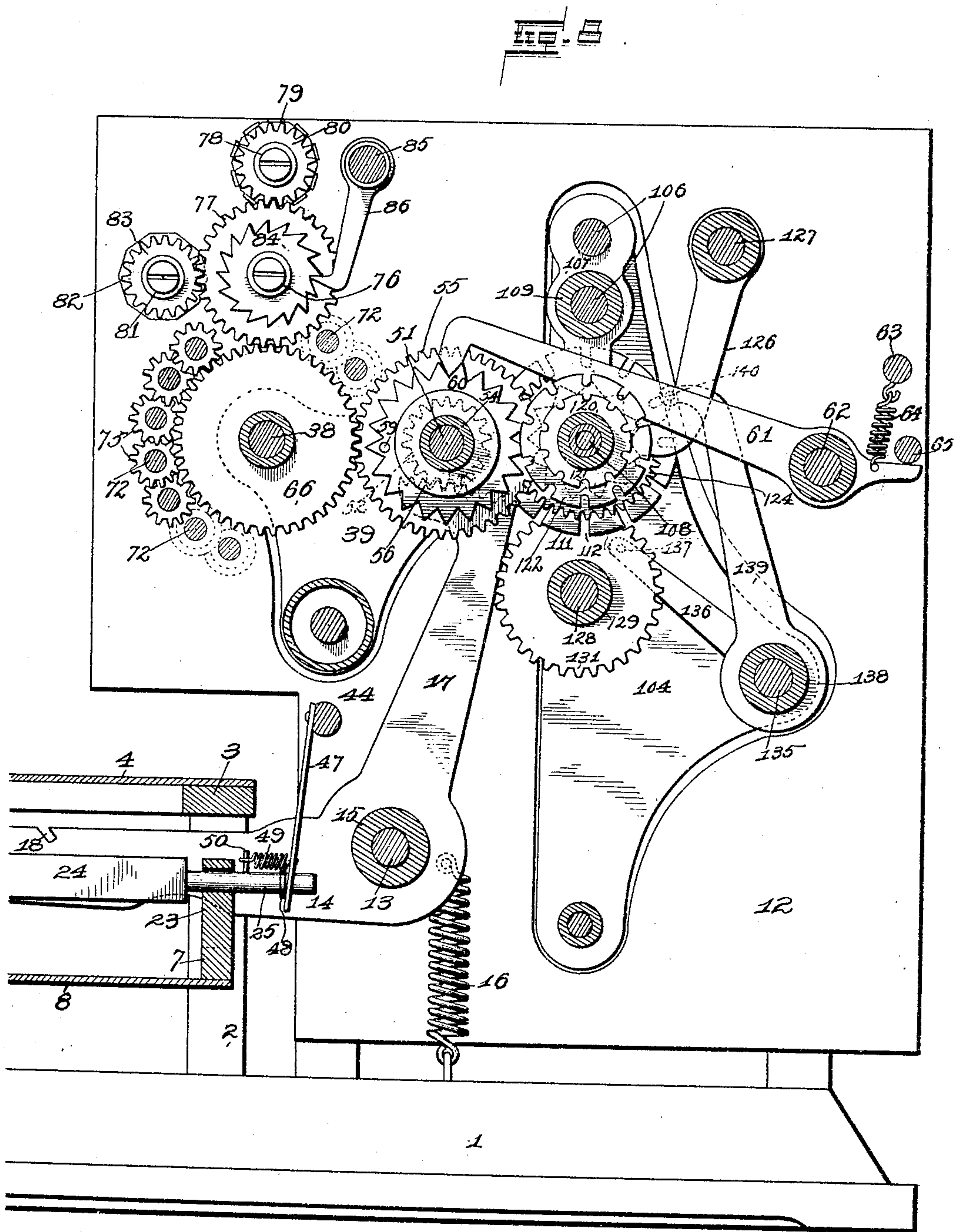
PATENTED OCT. 4, 1904.

C. STAHLBERG.
ADDING MACHINE.

NO MODEL.

APPLICATION FILED AUG. 13, 1900.

11 SHEETS—SHEET 7.



Witnesses
Alfred E. Eicher
John D. Rippey

Inventor.
Chas. Stahlberg.
By Higdon & Longan, Attys.

No. 771,505.

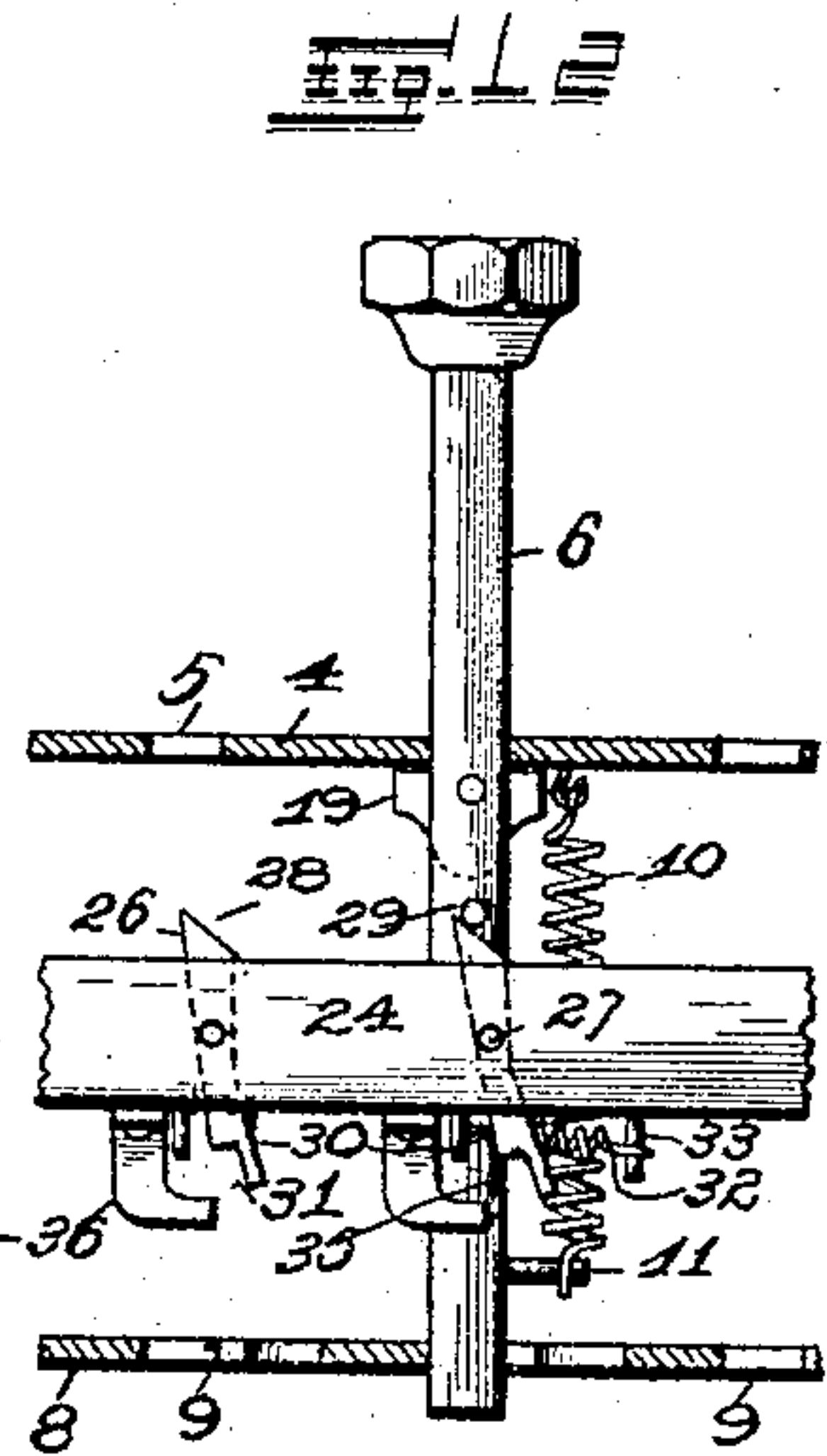
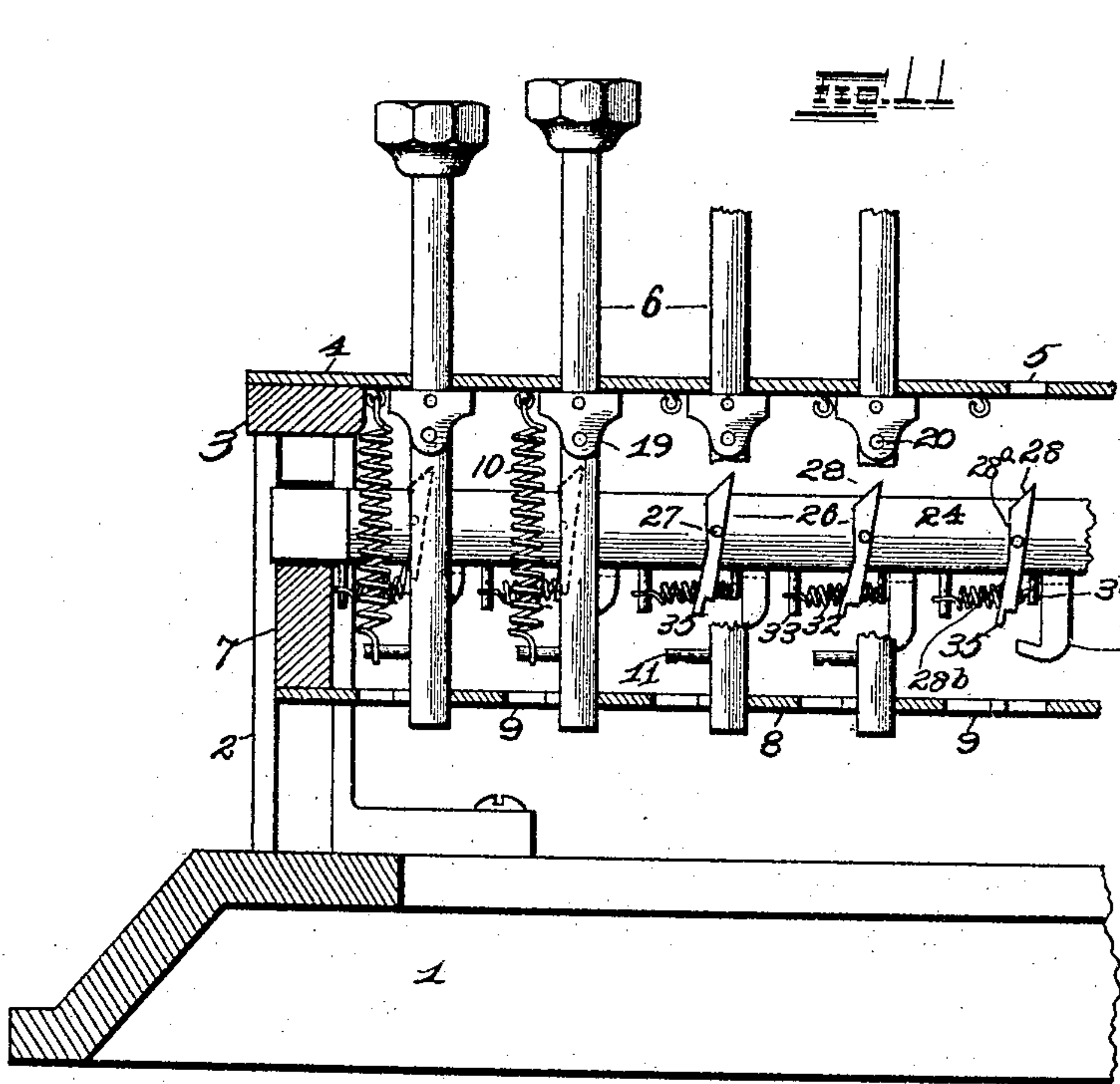
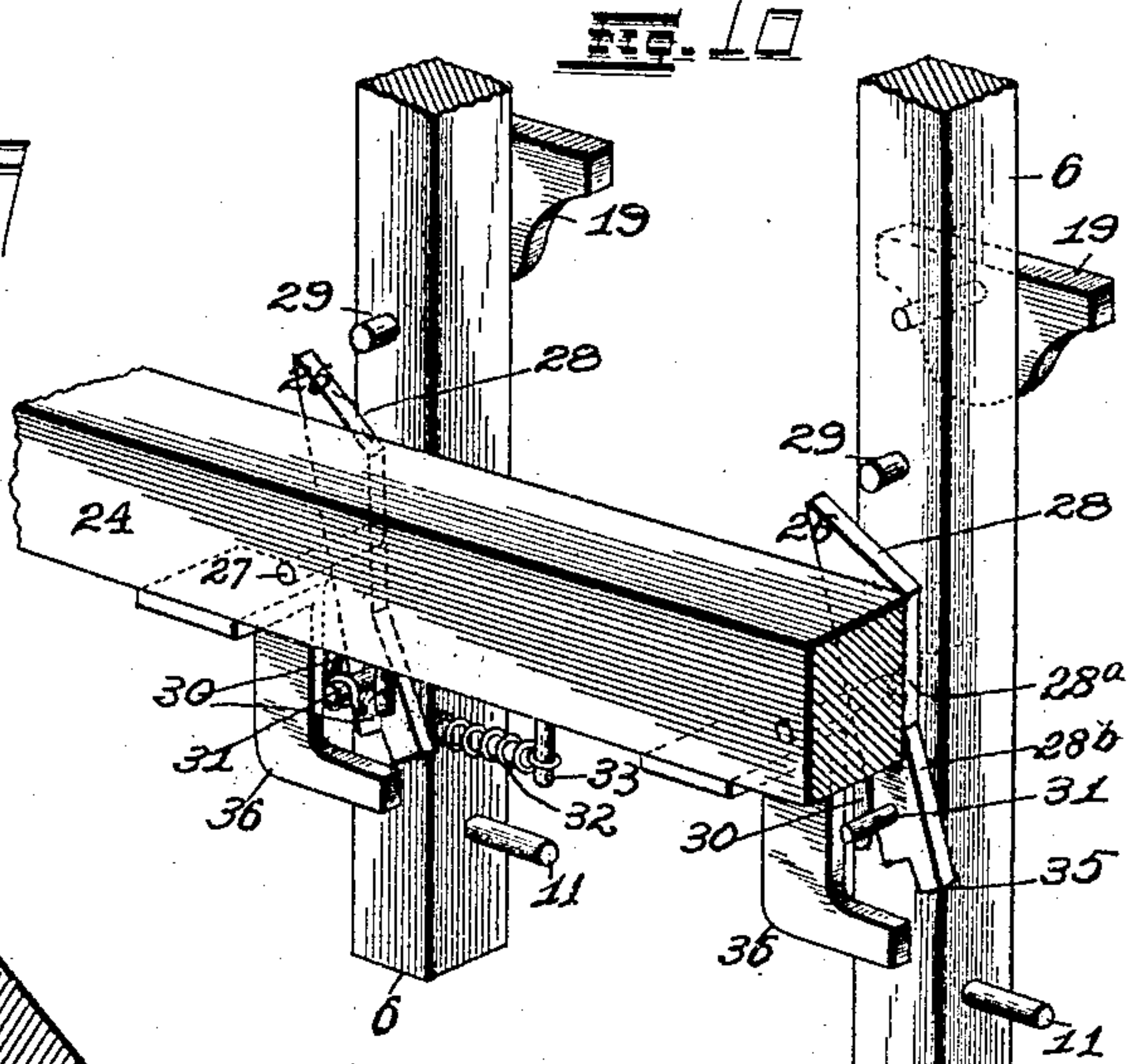
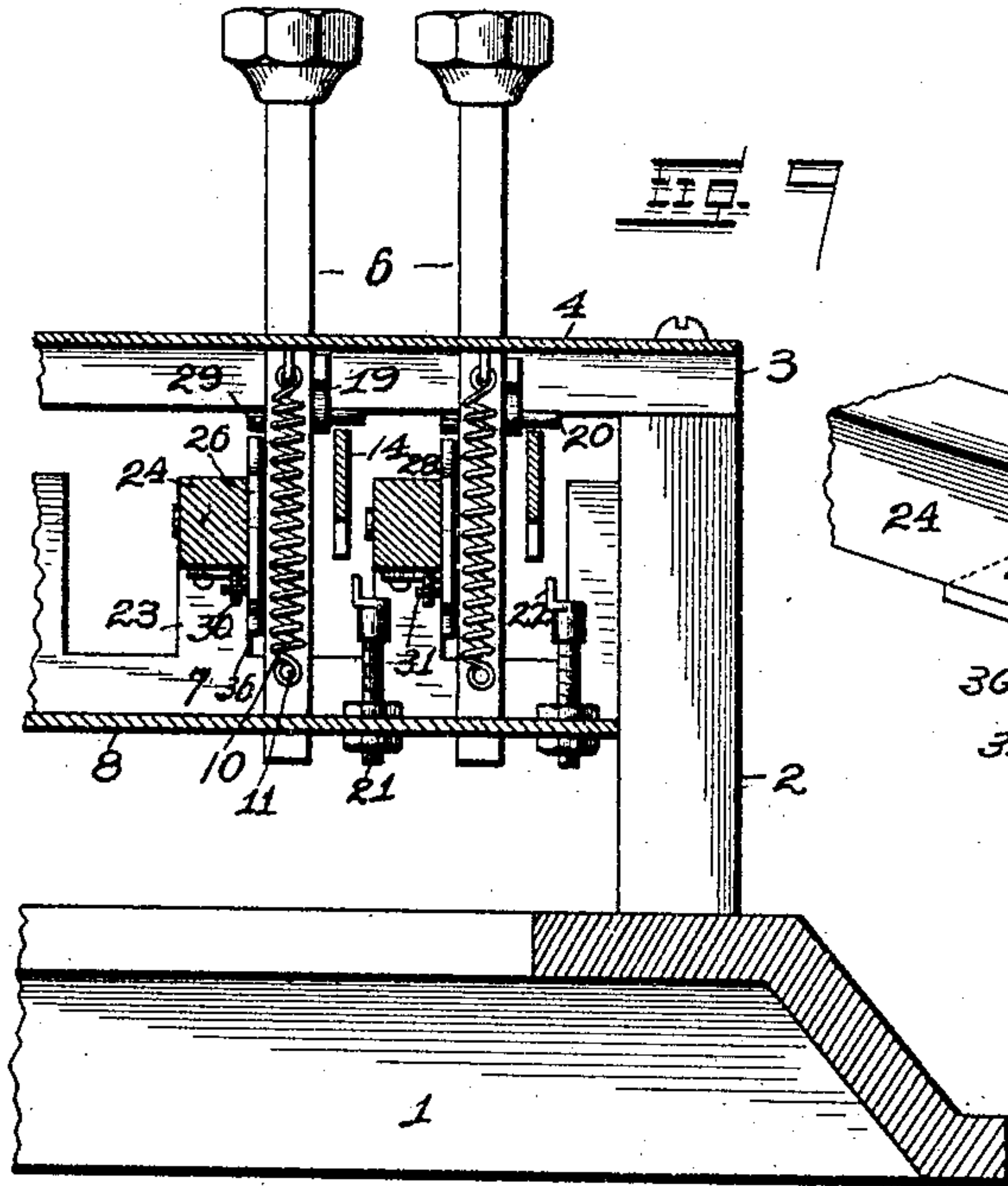
PATENTED OCT. 4, 1904.

C. STAHLBERG.
ADDING MACHINE.

APPLICATION FILED AUG. 13, 1900.

NO MODEL.

11 SHEETS—SHEET 8.



Witnesses
Alfred A. Eicher
John D. Rippey

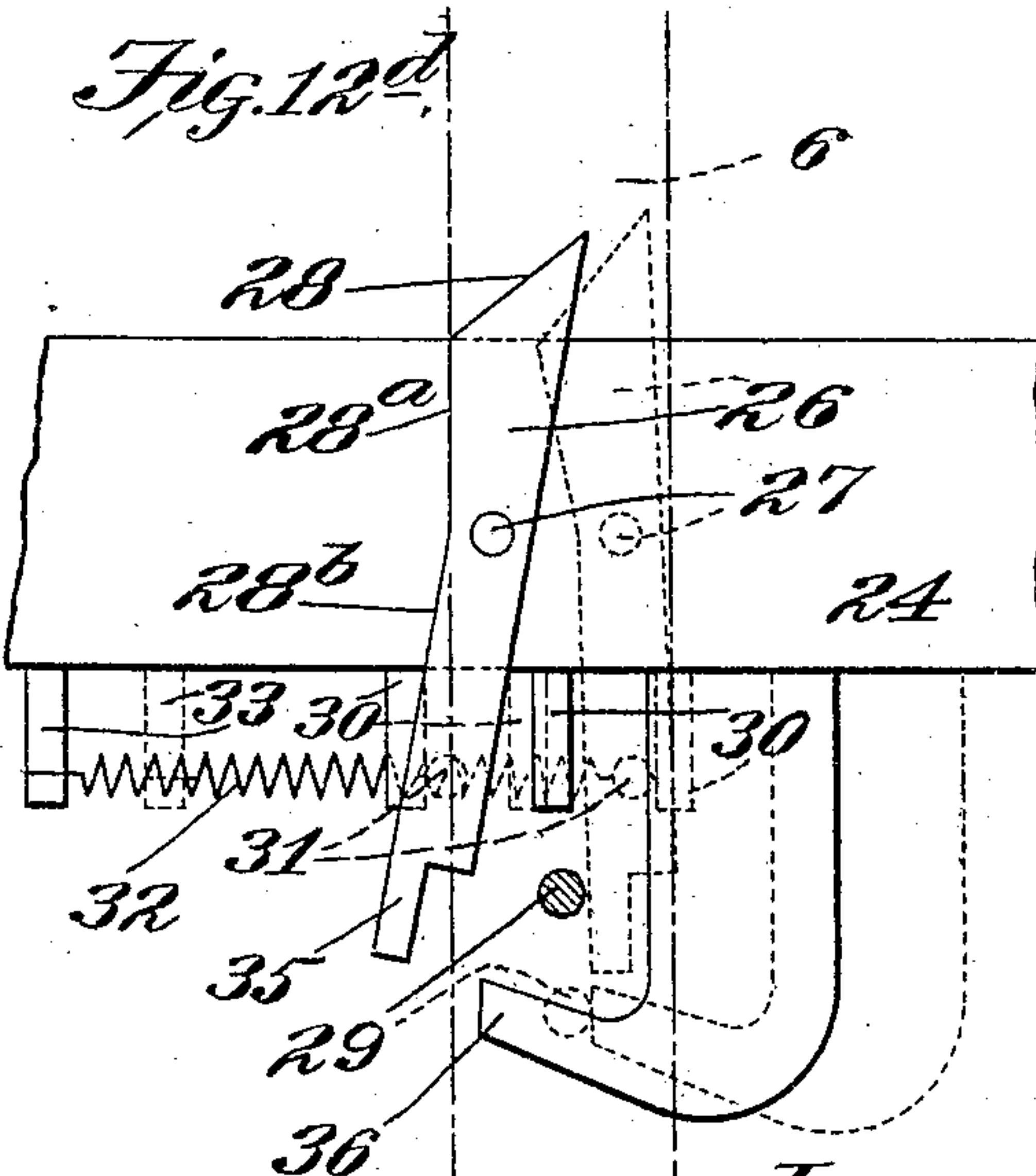
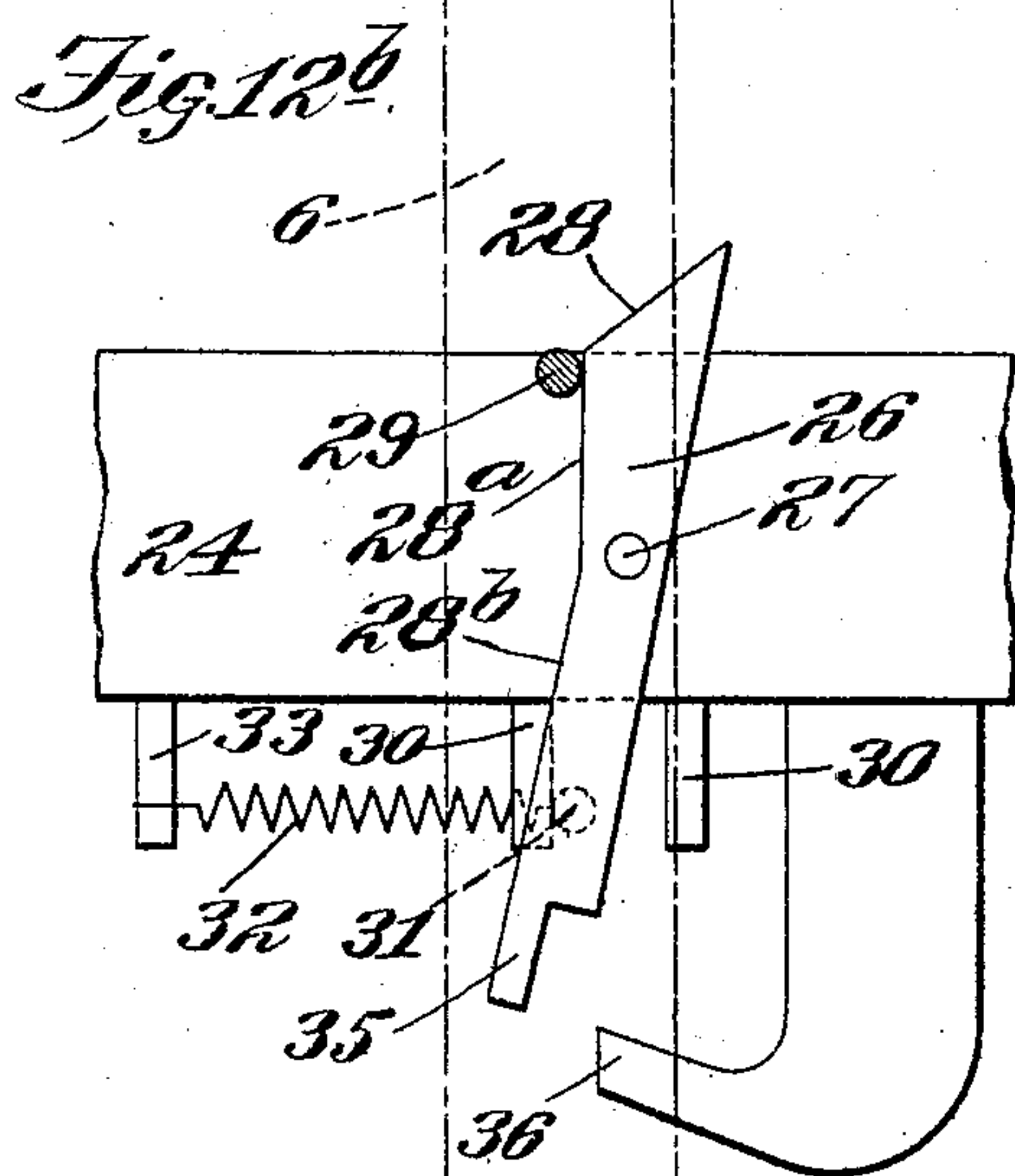
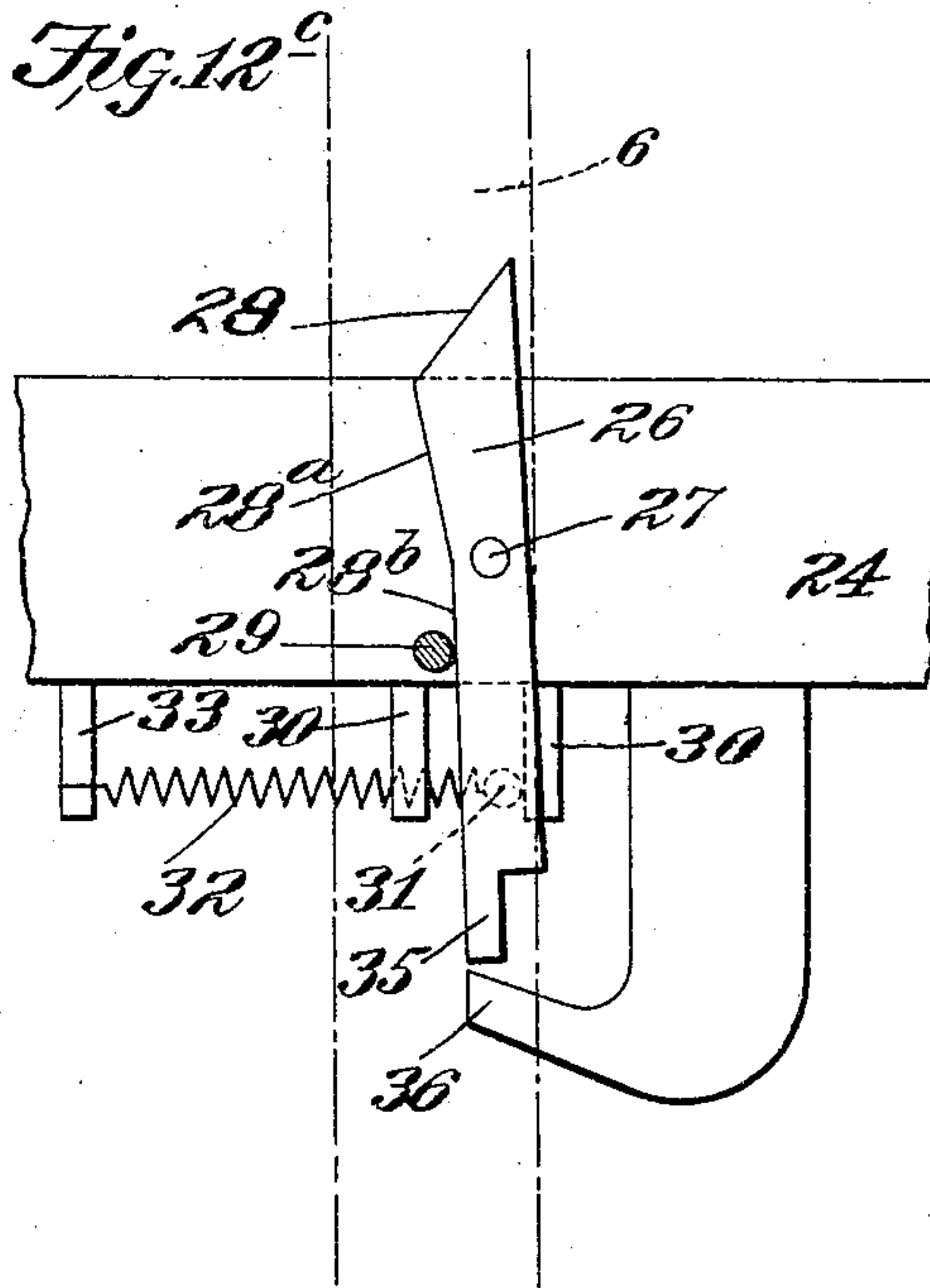
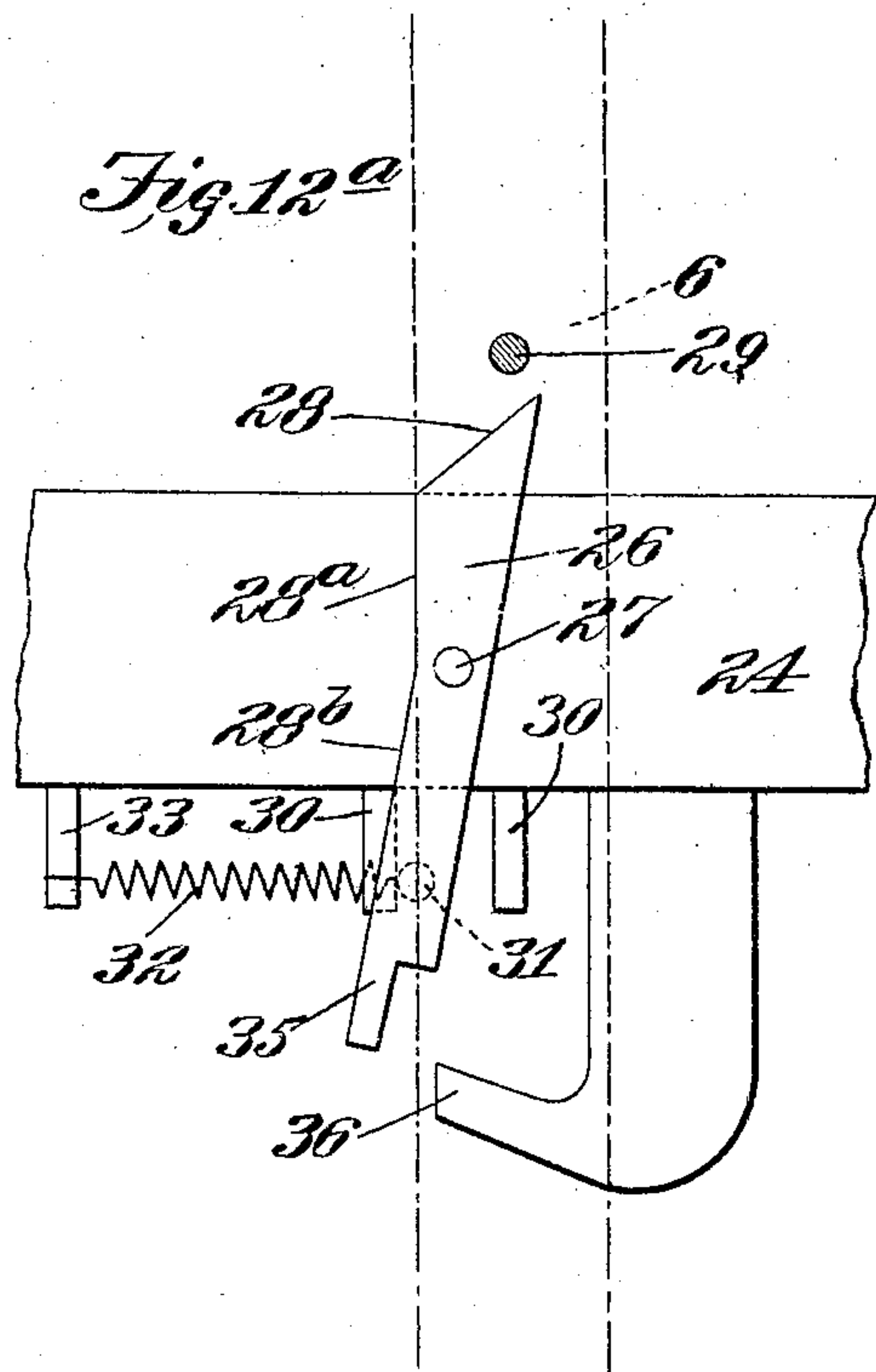
Inventor:
Chas. Stahlberg.
By Higdon & Langan, Attys.

C. STAHLBERG.
ADDING MACHINE.

APPLICATION FILED AUG. 13, 1900.

NO MODEL.

11 SHEETS—SHEET 9.



Witnesses:
G. J. Pennington
Galen Moore

Inventor:
Chas. Stahlberg,
by Rakewell Cornwall
Attys.

No. 771,505.

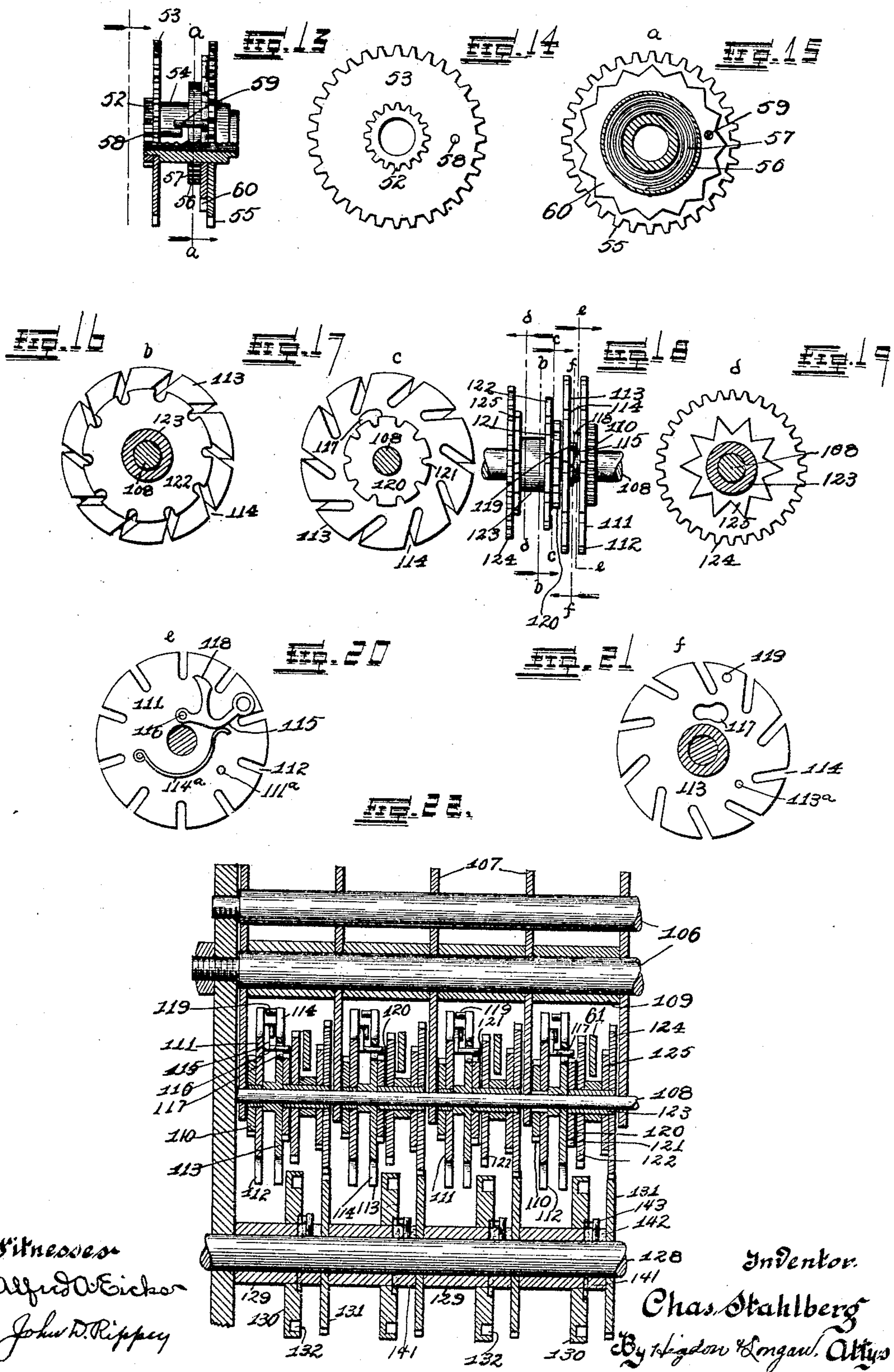
PATENTED OCT. 4, 1904.

C. STAHLBERG.
ADDING MACHINE.

APPLICATION FILED AUG. 13, 1900.

NO MODEL.

11 SHEETS—SHEET 10.

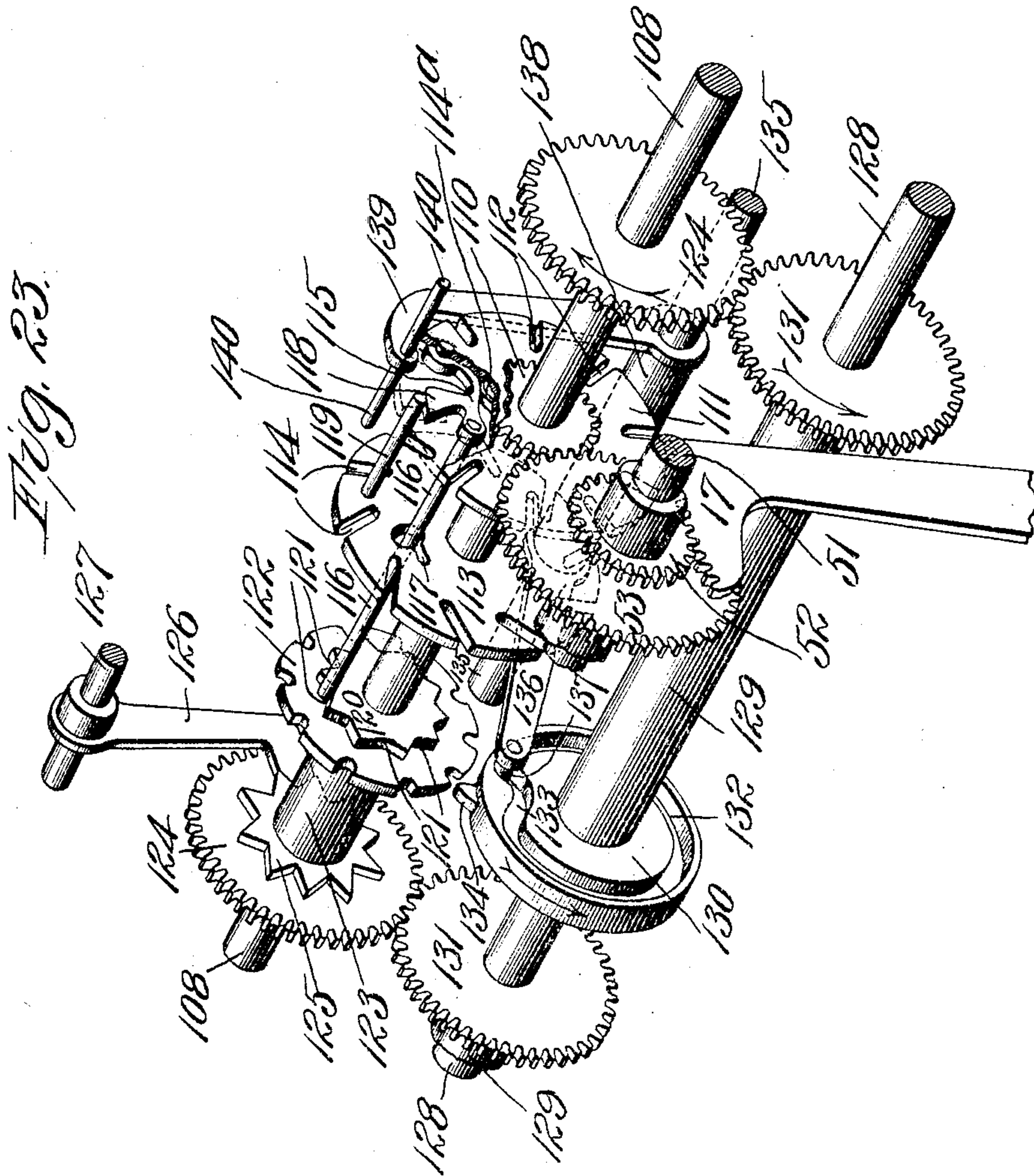


C. STAHLBERG.
ADDING MACHINE.

NO MODEL.

APPLICATION FILED AUG. 13, 1900.

11 SHEETS—SHEET 11.



Witnesses:
Wm. H. Scott
Ralph Keen

Inventor:
Charles Stahlberg
by Baker & Cornwall
Attys.

UNITED STATES PATENT OFFICE.

CHARLES STAHLBERG, OF ST. LOUIS, MISSOURI, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO ST. LOUIS COMPUTING COMPANY, A CORPORATION OF MISSOURI.

ADDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 771,505, dated October 4, 1904.

Application filed August 13, 1900. Serial No. 26,772. (No model.)

To all whom it may concern:

Be it known that I, CHARLES STAHLBERG, of the city of St. Louis, State of Missouri, have invented certain new and useful Improvements in Adding-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

This invention relates to a new and useful improvement in calculating-machines; and it consists in the novel construction, arrangement, and combination of the several parts, all as will hereinafter be described and afterward pointed out in the claims.

In the accompanying drawings, wherein like numerals of reference refer to corresponding parts in the several figures, Figure 1 is a side elevational view of the front portion of the machine or keyboard, the outer casing being removed. Fig. 1^a is a similar view showing the rear portion of the machine. Fig. 2 is a front elevational view of a portion of the machine, the remaining portion being shown in Fig. 2^a. Fig. 3 is a detail view showing the restoring devices for the item indicating and printing wheels. Fig. 4 is a detail view of the cam-disk used in carrying, which disk also acts as a driver in obtaining the total in the totalizer. Fig. 5 is a plan view of a portion of the machine, part of the keyboard being broken away, the remaining portion of said machine being illustrated in Fig. 5^a. Fig. 6 is a detail view showing the centering device for one of the gears in the carrying-frame. Fig. 7 is a detail view showing the mechanism for unlocking or uncoupling the carrying-frame to permit one of its elements to advance. Fig. 8 is a vertical longitudinal section through the rear portion of the machine. Fig. 9 is a cross-sectional view through a portion of the keyboard. Fig. 10 is a detail view showing portions of two key-shanks and associate devices. Fig. 11 is a longitudinal sectional view through a portion of the keyboard. Fig. 12 is a similar view as seen from the opposite side. Figs. 12^a, 12^b, 12^c, and 12^d are similar views showing the escapement-pawl in different positions. Fig. 13 is a detail eleva-

tional view of the drivers for the item type and indicating wheels. Fig. 14 shows one of the gears employed in this driving-train. Fig. 15 shows the other gear employed in this driving-train, the line of section of the spring-drum being taken on line *a a*, Fig. 18. Fig. 16 is a detail view of the carrying-train in elevation, being taken on line *b b* of Fig. 18 looking to the right. Fig. 17 is a similar view on line *c c* of Fig. 18 looking to the right. Fig. 18 is a front view of the carrying-train. Fig. 19 is a view taken on line *d d* of Fig. 18 looking to the left. Fig. 20 is a view taken on line *e e* of Fig. 18 looking to the right. Fig. 21 is a view taken on line *f f* of Fig. 18 looking to the left. Fig. 22 is a sectional rear view showing several trains in the totalizer, which trains will be hereinafter designated as "carrying-trains." Fig. 23 is a detail diagrammatic view illustrating my improved carrying mechanism.

The machine shown in the accompanying drawings is of that type wherein the items are set up on a keyboard, the keys of which cooperate with stops to adjust control-bars in one of nine different positions, depending upon the location of the key struck. The keys before operating a control-bar cause a segmental gear on the said bar to engage a train which is connected to and operates printing and indicating wheels. Before this train is restored to normal position the segmental gear is disengaged therefrom and a totalizer may be thrown into engagement with the item-wheels, whereby the restoration of said item-wheels operates to place the item in the totalizer. The totalizer is composed of several carrying-trains and may be engaged with the item-wheels to drive the latter to exhibit the total of items accumulated in the totalizer. The item-wheels are self-clearing. The totalizer may be cleared or returned to zero at will.

In the following description I have employed headings, under which will be found appropriate references to the parts identified with the respective headings.

While I have shown but one form of my

invention in the accompanying drawings, it is obvious that many minor changes in the construction, arrangement, and combination of the several parts can be made and substituted for those herein shown and described without in the least departing from the nature and principle of my invention.

The keyboard.—The keyboard (see Figs. 1 and 9 to 12) consists of a number of longitudinal series of keys running from "1" to "9," said keys having usual button heads and shanks 6, the latter being guided vertically by plates 4 and 8. These plates are carried by posts 2, rising from the base-framing of the machine. Cross-tie bars 3 connect the upper ends of the forward posts and support the forward edge of plate 4, while cross frames or bars 7 are arranged between said posts, to the lower edges of which are secured the plate 8. Plates 4 and 8 are provided with suitable openings 5 and 9, respectively, through which pass and are guided the key-shanks.

10 represents springs connected to the plate 4 and to pins 11 on the key-shanks for elevating said shanks. As usual, the keys are independently operable, and each series of keys has a control-bar common to it whereby the depression of any key of a series will actuate the bar common to that series in such manner that said bar will be moved to one of nine different positions, depending upon the relative location of the key struck. These "control-bars," as I have termed them, (indicated at 14 in the drawings,) are pivoted upon a shaft 13, mounted in the side frames 12 at the back of the machine, said bars being spaced apart by washers 15. Each bar is held in an elevated position by a spring 16, and each bar carries at its rear end a segmental gear extension 17. These bars 14 have rearwardly-inclined slots 18 in their upper edges opposite the key-shanks, which at this point carry pivoted blocks 19, designed to engage fixed abutments, in this instance the plate 4, to arrest the upward movement of the key-shanks. Blocks 19 carry projections or pins 20 at their lower ends in vertical alinement with the open ends of the inclined slots 18, whereby when any key is depressed bar 14 is swung on its pivot until arrested at the limit of its designed movement by adjustable stops 21, having heads 22 in the path of the pins 20. By referring to Fig. 1 it will be observed that the adjustable heads have shouldered projections 22^a on their upper ends, which in the operation of the device are designed to cooperate with the pins 20, said pins riding down the inner side faces of their cooperating projections 22^a. The purpose of this is to hold the pin 20 firmly in its slot 18 when the key is depressed, and in this manner lock the control-bar to the depressed key; otherwise the sudden depression of the key might result in the overthrow of the control-bar due to the momentum gathered in its

downward movement. From this it will be seen that the control-bar is forced downward by the pin 20 on the gravitating block engaging the bottom of its inclined slot 18, and before the pin 20 is stopped in its downward movement it passes along the inner face of the projection 22^a, and thus prevents the gravitating block from rocking in one direction, the walls of the slot 18 preventing the block from rocking in the other direction, and so the control-bar is locked to the key-shank and is prevented from moving past the designed position. Blocks 19 being pivotally mounted on the key-shanks will, when the keys to which they are pivoted are depressed, swing on their pivots by reason of the inclination of the slots 18. Thus the key has an initial downward movement or vertical play during the travel of pin 20 in slot 18, and the bar 14 is not moved until the pin reaches the bottom of the slot.

The rear cross-bar 7 affords stops 23 for horizontally-sliding bars 24, arranged in juxtaposition to the key-shanks and on the opposite side thereof with respect to the cooperating control-bar 14. These bars 24 have reduced portions 25 at their rear ends, provided with collars 48 and pins 50. (See Fig. 8.) Bifurcated arms 47 on a rock-shaft 44 bear against the rear faces of collars 48, being yieldingly held thereagainst by means of a spring connected thereto and to the pins 50. In this manner the rearward movement of the bars 24 will positively rock the shaft 44 in one direction, while the forward or return movement of said bars is effected by the means which yieldingly return the shaft 44 to its normal or home position.

It will be noted that the rock-shaft 40 is common to all of the bars 24 and that when any one of said bars is operated to rock said shaft the springs which connect the bifurcated arms 47 with the normal bars 24 are placed under tension. Thus if any other bar 24 is subsequently operated its connected spring will tend to draw the same rearwardly.

I have before referred to an initial idle movement of the keys, and it is during this movement that the bars 24, common to the series in which the operated key is located, is moved rearwardly to rock the shaft 44.

Located under pins 29, projecting from the key-shanks, are escapement-dogs 26, pivoted to the bars 24 at 27. The front edges of these escapement-dogs are provided with cam-faces 28, 28^a, and 28^b, the first mentioned being in the nature of a beveled upper end. The initial downward movement of the key-shank (see Fig. 12^a) will cause its pin 29 to strike the beveled edge 28 of the escapement-dog located immediately therebeneath (see Fig. 12^a) and move the bar 24 rearwardly, (see Fig. 12^b,) because the lower end of the escapement-pawl carries a pin 31, operating between two pins 30, projecting from the lower edge of the bar 24,

and said pin 31 is in contact with the foremost of said pins 30. The cam-face 28^a is disposed vertically, so that when the pin rides down over this cam-face the bar 24 will be held in a stationary position by reason of the vertical movement of the pin. (See Fig. 12^b.) When the pin passes onto the cam-face 28^b below the pivot 27, as shown in Fig. 12^c, the dog will be rocked and the face 28^b disposed vertically, so that a continued downward movement of the pin results merely in so rocking the dog and holding the bar 24 rearwardly. The pin 31 will now engage the rearmost pin 30, placing a spring 32, connected to pin 31 and to a pin 33 on the bar 24, under tension, which tension is directed to pulling the lower end of dog 26 forwardly. The lower end of dog 26 is provided with a stepped shoulder 35, opening rearwardly, and as the pin 29 passes beneath the lower end of the dog it is received upon a projection 36, and the spring draws the lower end of the dog over the pin 29, as shown by dotted lines in Fig. 12^d. The projection 36 is substantially L-shaped, and the forward face of its horizontal member lies in the vertical plane of the cam-face 28^b when the pin 29 is riding thereon, and consequently the pin 29 easily passes from the cam-face of the dog onto the fixed support 36. This insures the bar 24 being held rearwardly until the key reaches its lowermost position, in which the dog is released, and when the key rises the pin 29 is permitted to pass above the projection 36 and behind the dog, as shown in Fig. 12^d, allowing the bar 24 to be returned to its normal or forward position before the control-bar 14 is released. By this construction it will be noted that the keys do not remain down after being pressed, that the rock-shaft 44 is first operated through the bar 24 before the control-bar is moved, and that after the depression of the control-bar the bars 24 are released and the rock-shaft 44 is in readiness to return to its home position before the control-bars can be restored. Briefly stated, the keys by contacting with their respective stops determine the position of the control-bars and the throw of their connected segmental gears 17, while the bars 24 effect an engagement between the segmental gears and the item recording and indicating mechanism, whereby the said mechanism is in position to be operated by the segmental gears before the latter are actuated, and said mechanism may be disengaged from said segmental gears immediately upon the completion of the movement of the said gears in one direction, (the forward.) The item mechanism referred to is normally out of mesh with the segmental gears.

60 *Means for effecting an engagement between the item recording and indicating mechanism and the control-bars.*—38 indicates a pivot-shaft mounted in suitable bearings in the frame-plates 12, upon which shaft is arranged

a swinging frame composed of the side frame- 65 pieces 39, which are spaced apart by suitable tie-bolts. Spring 40 (see Fig. 1^a) is connected to the swinging frame 21 to hold the same normally in an elevated position. An adjustable fixed stop 41, coöperating with a projec- 70 tion 42 on the swinging frame, limits the upward movement of said frame.

43 indicates a pin or projection extending laterally from one of the frame-plates 39, being received in a slot 46 in an arm 45, fixed 75 to the rock-shaft 44. Thus when the rock-shaft 44 is rocked by any of the bars 24 the item mechanism carried by this swinging frame is caused to primarily engage the seg- 80 mental gears by reason of the depression of said swinging frame through the instrumentalities just above mentioned.

Item-drivers.—51 indicates a shaft carried by the swinging frame-plates 39, upon which 85 are arranged what I term "groups" of driving mechanisms common to each segmental gear 17, said mechanisms being provided with means whereby they yieldingly drive the item mechanism, and when a total is being taken said item-driving wheels serve as yielding in- 90 termediate gears. (See Fig. 8.)

52 indicates a pinion loosely mounted on the shaft 51, which pinion is designed to mesh with the segmental gear 17 when the latter is in its rearmost position, (before it is moved 95 by the control-bar.) This pinion has a gear 53 conjoined thereto. Gear 53 is fixed to a sleeve 54, mounted upon the shaft 51, upon which sleeve is loosely mounted a gear 55, said gear being connected with the sleeve by a torsion- 100 spring 57, carried in a drum 56. In this manner the gear 55 may be rotated independently with respect to the primary gear 53, the torsion-spring tending at all times to restore the gear 55 to its normal relation to the driving 105 or primary gear 53. This relation between these two gears is established by means of a pin 58, extending inwardly from the face of primary gear 53 in the path of a pin 59 on the gear 55. (See Figs. 13 and 14.) 110

60 indicates a centering-wheel, in appearance resembling a star, which is conjoined to the secondary gear 55. (See Fig. 15.)

61 indicates a centering-pawl coöperating with the V-shaped notches in the centering- 115 disk 60. This pawl is mounted on a shaft 62, which has a bearing in the frame-plates 12, suitable washers or sleeves being employed to properly space the centering-pawls apart. (See Figs. 5 and 8.) 120

63 indicates a rod carrying springs 64, connected to tailpieces on the centering-pawls to hold them yieldingly against the centering- 125 disks 60. 65 indicates a stop-bar coöperating with the said tailpieces for relieving the centering-disks of undue friction. (See Fig. 8.)

Item indicating and printing wheels.—66 indicates transmitting-gears mounted on shaft

38 and spaced apart by appropriate washers or sleeves 67, so as to be constantly in mesh with the secondary gears 55.

68 and 69 are pins projecting from the faces of the gears 66 and in whose path are located pins 70, fixed in the shaft 38, said pins protruding through circumferential slots 71 in the sleeves 67. (See Fig. 3.) These pins 70 normally engage the pins 68 and aline the gears 66. The pins 70 cooperate with the pins 69 for the purpose of restoring the wheels 66 to normal position after they have been operated in placing an item in the item-wheels. The restoration of the gears 66 is effected by a backward rotation of the shaft 38, which is produced by mechanism hereinafter referred to. The pins 69 are circumferentially staggered on the wheels 66, so as to form a spiral series, whereby no two adjacent wheels will be started back at the same time. This results in successive restorations of the gears 66, commencing with the mechanism identified with the column of lowest orders. Thus the carrying is effected in the different groups of mechanisms in successively-increasing orders.

72 indicates shafts mounted in frame-plates 12 and upon which are arranged transmitting-pinions 73, in mesh, respectively, with the several gears 66.

74 indicates gears mounted upon shafts 38, with which mesh pinions 75 on the shafts 72, whereby the item indicating and recording devices may be grouped close together. (See Figs. 2 and 5.) These trains of gearing from the gears 66 to gears 74 are identified with the several columns and are independently operable, being controlled by the different series of keys.

76 indicates a shaft preferably supported in one of the frame-plates 12 above the shaft 38, and upon which shaft 76 are gears 77, meshing, respectively, with the gears 74.

78 indicates a shaft upon which are mounted gears 79, meshing, respectively, with the gears 77. These gears 79 have type-wheels conjoined thereto, said wheels carrying on their peripheries printing characters from "1" to "9" and also "0," the latter normally occupying a position in the printing-line.

I have not shown in this application any type-hammers or means for taking an impression from the type in the printing-line; but it is my intention to use some approved construction for printing and recording items and totals from these printing-wheels.

81 indicates a shaft upon which are arranged gears meshing, respectively, with the gears 77, and to which gears 82 are conjoined indicating-disks 83, forming sight-wheels for the operator. (See Fig. 8.) These sight-wheels indicate the amount of each item registered, and to effect this they are provided with numerals from "0" to "9," inclusive, on their peripheries.

Where the machine is used to register, re-

cord, and add the amounts indicating sums of money, such as at present current in the United States, the dimes and cents wheels are preferably separated from the units dollar-wheel in lieu of printing the decimal-point.

Item-mechanism lock.—84 indicates ratchet-wheels conjoined to the several gears 77, respectively, with which ratchets cooperate pawls 86, mounted fixedly upon a shaft 85. Shaft 85 extends outwardly beyond the frame 12 on one side of the machine, where it carries a depending rock-arm 87.

88 indicates a rock-arm extending upwardly from the outer end of shaft 38. A pin 89 on the upper end of arm 88 engages the arm 87, which rocks the shaft 85 to disengage the pawls from their ratchets whenever the arm 88 moves rearwardly.

90 indicates a pin on a downward extension of arm 88, which pin fits in slot 92 in the end of rock-arm 93, fixed to the shaft 44.

Shaft 85 is provided with a pin 166, to which is connected a spring 165, having its other end connected to a pin 167, fixed in the frame-plate 12, (see Fig. 5^a.) whereby the pawls 86 are normally held in engagement with the ratchets 84.

By the above construction all of the wheels 77 are released whenever any of the bars 24 is in other than a home position.

Restoring the item-indicating and type wheels.—93 indicates a stud-shaft in one of the frame-plates 12, upon which is mounted a segmental gear 94, meshing with a pinion 95, arranged upon the outer end of shaft 38. (See Figs. 1^a and 2^a.) A spring 96 holds this segmental gear in an elevated position. By depressing this segment shaft 38 is rotated, so as to cause its pins 70 to pick up gears 66 by engaging their pins 69 and return said gears and their trains connected therewith to a normal position.

97 indicates a handle on the gear 94, by which said gear may be operated. This gear 94 is also operable by a lever 98, whose hub portion 100 is mounted upon the stud-shaft 93. The segmental gear 94 is provided with a pin or projection 99 for cooperating with the lever-handle 98. Operating the handle 97 independently of lever-handle 98 will cause the type and indicating wheels to be returned to zero position without placing the items in the accumulating or totalizing mechanism. Thus the item mechanism may be cleared in the event that a mistake is made, and therefore the handle 97 might properly be termed a "correction-handle."

Accumulating the items in the totalizer.—By depressing the lever-handle 98 the segmental gear 94 is not only operated to restore the gears 66 through their pins 69, but the return movement of said gears being exactly proportional to their advance is utilized in driving the totalizing-gears. A condition precedent to the restoration of the gears 66 through the segmental gear 94 to place the items in

the totalizer is the engagement of the totalizer-wheels with the gears 66 through the primary gears 53, coupled to the secondary gears 55. In order to effect this engagement before the gears 66 start on their return movement, the lever-handle 98 is notched in line with the projection 99, so that its initial movement will be utilized in effecting the aforesaid engagement prior to the commencement of the return or backward movement of said wheels. This is accomplished by means of a cam-notch 101 in the hub 100 of lever 98, in which notch rests the projection 157 of a lever pivoted at 156, whose other member, 155, is provided with a cam-face for coöperating with a pin 158 on the swinging totalizer-frame 104. (See Fig. 1^a.) This frame is pivoted in bearing-plates 105, and when the projection 157 is in the notch 101 the totalizer is out of engagement with its drivers. When the lever 98 is depressed, the frame 104 is rocked forward to engage the totalizer with its drivers, after which the lever 98 restores the gears 66 and places the item theretofore set up therein in the totalizer. This is accomplished by the gear 66 in its backward rotation backwardly rotating the gear 55, and through the medium of the spring the gear 53 is also caused to rotate and by rotating the pinion 110 set up the item in the connected totalizer-train. This reverse rotation of gear 66 and its driven train effects the restoration to zero of said item-train and its connected parts and at the same time sets up the item in the totalizer-train, leaving the item in the totalizer-train when the gear 53 is thrown out of mesh with its pinion 110.

To hold the rocking frame 39 in an elevated position and prevent engagement between pinions 52 and the segmental gears 17 during this operation of placing the item in the totalizer, I provide an adjustable projection 158^a on the frame 104, which is designed in the forward position of the frame to occupy a position under projection 159 on the frame 39. Likewise when the frame 39 is depressed to engage the pinions 52 with the segmental gears 17 the projection 159 is located in the path of the projection 158^a and prevents the frame 104 from being rocked forward to engage the totalizer-wheels with the primary gears 53.

153 indicates a stop on frame 104, which coöperates with adjustable stops 152 and 154 to limit the rocking movement of said frame.

55 *Carrying to adjacent trains of higher order.*—106 indicates tie-bolts in the upper ends of frame-plates 104, which bolts or rods carry downwardly-extending plates 107.

108 indicates a shaft journaled in the lower ends of the plates 107. (See Fig. 22.) These plates, in addition to supporting the shaft 108, form division-walls for groups of gearing, corresponding in position to the driving-groups on shaft 51.

65 109 indicates sleeves on one of the shafts

106 for spacing the plates 107. (See Figs. 8 and 22.)

Each group or train of wheels on the shaft 108 comprises a pinion 110, in alinement with the primary gear 53.

Referring now to Figs. 16 to 21, inclusive, 111 is a disk conjoined to pinion 110, said disk having preferably ten radially-disposed slots 112 in its periphery. 113 indicates a companion disk, preferably provided with ten angularly-arranged slots 114 in its periphery. In the normal position of these disks the outer ends of the slots 112 and 114 register. This registration is normally established by means of a spring 114^a, whose ends are connected to the disks, respectively. A pin 111^a on disk 111 coöperates with a pin 113^a on the companion disk to insure registration of the slots. 115 indicates a pawl pivoted to the inner face of disk 111, the free or inner end of which carries a pin 116, passing through an opening 117 in the companion disk, beyond which it coöperates with a notched disk 120, said last-named disk being preferably provided with ten V-shaped notches 121. 118 is an extension of the pawl 115, which coöperates with a pin 119 on the disk 113, which pin holds the pawl in engagement with notched disk 120 and locks said disk 120 to the disks 111 and 113. 122 is a notched disk conjoined to the disk 120, both of said disks being fixed to a sleeve 123, which carries a gear 124 at its opposite end. 125 is a centering or star-shaped disk, with which coöperates a pawl 126, pivoted on a shaft 127.

From the above it will be seen that the disks 111, 113, 120, and 122, and the gear-wheel 124 are all locked together by the pawl 115 and rotated collectively. However, when the disk 113 is rotated independently, so as to relieve the pawl 115 from the restraint of pin 119, permitting the pawl to ride over the disk 120, said disk 120 and its connected centering-disk 122 and gear 124 are free to turn.

128 indicates a shaft mounted in the frame 104, preferably below the shaft 108, and upon which are a series of sleeves 129, each of said sleeves carrying a cam-disk 130 and a gear-wheel 131, the former being preferably immediately under the notched disk 122, and the latter in mesh with the gear 124 of the next adjacent train of lower order. The cam-disk is provided with a groove 132 in its side face, which groove is essentially concentric, save for a fluctuation 133. This cam-disk also carries a radial projection 134, which is designed to coöperate with and advance the distance of one step the disk 122 upon each revolution of the cam-disk. This advance of disk 122 displaces the pin 116 and causes it to enter a notch 121 in the rear of the one it formerly occupied. This circumferential displacement of disk 120 is only possible when the disk 113 is circumferentially displaced to carry the pin 119 away from the projection 118 on pawl 115 to release

said pawl. This displacement of disk 113 is effected by means of a bell-crank lever pivoted on a shaft 115, mounted in the frame-plates 104. This bell-crank lever consists of a member 136, carrying a pin 137, which rides in cam-groove 132, a hub portion in the form of a sleeve 138, and a member 139, carrying a pin 140, designed to simultaneously enter the slots 112 and 114 whenever the member 136 is caused to dip by its pin entering the fluctuation in the cam-groove. (See Fig. 7.) The dipping motion of the bell-crank lever, the displacement of the disk 113, and the consequent release of the pawl are practically coincident with the engagement between the projection 134 on the cam-disk and the notched disk 122, which notched disk is rotated one-tenth of a revolution. As soon as pin 116 is seated in its newly-found notch and as soon as the bell-crank lever passes beyond the fluctuation in the cam-groove the disk 113 will be released from its displaced position, and the spring 114^a will restore said disk to lock the pawl and incidentally the disks and gears 111, 113, 120, 122, and 124 until they shall have made another revolution or rather nine-tenths of a revolution, the last tenth being devoted to the operations above described.

In Fig. 23 I have illustrated diagrammatically the carrying mechanism, and in order that the operation of the parts may be understood I will briefly describe the construction shown in this figure. The segment 17 is shown in mesh with the gear 52 on the shaft 51; but it will be understood that in ordinary operation when the gear 53, conjoined to the gear 52, is in mesh with the gear 110 on shaft 108 the segment 17 is out of mesh with the gear 52. I have shown segment 17 in the figure merely for the sake of locating it with relation to the gear 52. I have not shown the companion transmitting-gear 55, as the same would obscure the view. Assuming that motion is transmitted through gear 53 to the gear 110, the notched disks will be rotated as long as the pin 119 engages the pawl 115, so as to lock the pin 116 of said pawl into one of the recesses of the disk 120, the disks 111, 113, 120, 122, and the gear 124 will be locked together and driven by the gear 53. These elements are in this way conjointly moved to register items, as controlled by the devices before described, such movements being in tenths of a revolution. The gear 124, before referred to, meshes with the gear 131 on the shaft 128, which gear 131 is mounted on a sleeve 129, the opposite end of said sleeve carrying the cam 130, located under the disk 122 of the next adjacent train of higher order. Cam 130 carries a projection 134, designed to engage in the notches of the disk 122 and drive said disk, and consequently the next adjacent train of higher order, the distance of one-tenth of a revolution for every complete revolution of the cam 130. In this manner cam

130 is driven by a train of lower order, and whenever said train of lower order is moved a complete revolution the notched disk 122 in the next adjacent train of higher order is moved one-tenth of a revolution, and the carrying from one train to the next is thus effected. In order to arrest the train of higher order, or rather one part of it, so as to effect a movement of the disk 122 relative to the stationary part, the bell-crank lever, composed of the arms 136 and 139, is brought into action, the position of said lever being controlled by the cam-groove in the cam. The arrows on the several disks and gears indicate their designed direction of movement in the registration of items, and it will be seen that the projection 134 is just leaving the notched disk 122, in which event the roller on member 136 of the bell-crank lever will ride in the concentric portion of the cam-groove for nine-tenths of a revolution or until the projection 134 is again in position to engage and drive the disk 122. The cam shown in this figure (23) is driven by the train of lower order, the gear 124 identified with which is shown on the near end of the shaft 108. When the projection 134 is in position to engage the disk 122, the fluctuation in the cam-groove is so located that the next tenth of a revolution of the driving-train of lower order will cause the bell-crank lever to rock, placing the pin 140 in the notches or recesses of the disks 111 and 113. Inward movement of arm 139 accomplishes the following: Disk 111 is arrested, and though at the time of its arrest it may be receiving motion through the transmitting-gear 53 it will be remembered that there is a yielding connection between gears 55 and 53, which permits of the arrest of this disk 111, the motion being absorbed by the spring between gears 53 and 55, and upon the release of disk 111 said disk is driven by the spring to the desired extent. However, we will assume that for the purposes of this description disk 111 has been arrested. The inward movement of pin 140 circumferentially displaces disk 113 with respect to disk 111, so as to carry the pin 119 away from the projection 118 of the pawl 115, and thus the pawl lies passive, its pin 116 merely resting by its own weight, if the disks are in proper position, in one of the notches of the disk 120. At least disk 120 and its conjoined disk 122 are free to move when driven by the projection 134. Projection 134 can only drive disk 122 coincidently with the rocking or dipping movement of the bell-crank lever, and consequently the pawl 115 is unlocked only when disk 122 is receiving motion from the cam projection. The instant that the driving action between the cam projection 134 and the disk 122 has been completed the bell-crank lever leaves the fluctuation in the cam-groove and raises the pin 140 out of the disks 111 and 113, said disks now being restored to normal position by their restoring-spring, before de-

scribed, so that the train is locked until the cam has again been rotated nine-tenths of a revolution by the gear 124 identified with the train of lower order.

5 Should it happen that in restoring the wheels 66, which transmit the item through the gears 55 53 110, &c., the gear 110 should be temporarily locked by its conjoined disk 111 being arrested by the pin 140, (in the act
10 of carrying from one train to the next,) it will be obvious that the spring 57, between and connecting the gears 55 53, will yield and store up the movement imparted by gears 66 until the gears 53 and 110 are released. Upon
15 such release the spring will cause said gears to rotate at such speed as to catch up to the positively-driven gear 55.

Taking a total and clearing the totalizer.—
From what has been said above it is evident
20 that the printing and indicating wheels are cleared or returned to zero when the item is placed in the totalizer. Repeated operations of the machine will cause the items to accumulate in the totalizer, and in machines of
25 this character it is desirable to operate the printing and indicating wheels so that they will print and exhibit the total of the items accumulated in the totalizer and also to clear the totalizer or return it to zero. To effect
30 this, I provide sleeves 141 on the shaft 128, which sleeves have slots 142, through which project pins 143, fixed on the shaft 128. (See Fig. 4.) The cam-disks 130 are provided with recesses 144 and pins 145. The pins 143 are
35 normally out of the paths of the pins 145, so that the cam-disks may be rotated without interruption. The cam-disks and their associate parts, as well as the sleeves 141, are held against longitudinal movement by the frame-plates 104; but the shaft 128 is longitudinally
40 movable, being held in its normal position, wherein the pins 143 are out of the paths of the pins 145, by means of a spring 147 bearing against a head 146. (See Figs. 2 and 5.)
45 148 indicates a crank-handle fixed to the opposite protruding end of shaft 128, the inner end of the staff of which is provided with a cam-surface 149, operating against a fixed projection 150. (See Fig 2^a.) By this
50 construction the shaft 128 is longitudinally displaced (or drawn to the right) as it is rotated, such longitudinal displacement locating the pins 143 in the paths of the pins 145 of all of the cam-disks which have been operated. The
55 rotation of shaft 128 thus drives the cam-disks and gears 131 and their respective trains on the shaft 108 backward, and through the connected intermediate gears rotating forwardly the total will be indicated on the
60 disks 83 and will also appear in the printing-line on the wheels 80. It will be obvious that the shaft 128 operates the respective type-wheels a distance corresponding to the backward movement of each of the respective
65 cam-disks 130. When the cam-disks reach

their initial or home position, they are arrested.

In transmitting the total as contained in the totalizer through the several trains to the printing and indicating wheels means must
70 be provided for releasing the gears 77. Such is shown in Fig. 1^a, wherein the frame-plate 104 of the totalizer is provided with a projection 162, which when the frame-plate is in a forward position strikes one member of a
75 bell-crank lever 160, pivoted at 161, whose other member is connected by a link 163 to a projection 164 on the hub of the rock-arm 87. This rock-arm, it will be remembered, is fixed to the shaft 85, which carries the locking-
80 pawls 86.

Pawls 86, as before stated, are normally held against ratchets 84 by a spring 165, (see Fig. 5^a,) one end of which is attached to a pin
85 166 on shaft 85 and the opposite end to a pin 167 on plate 12. This spring serves to hold the bell-crank lever against the projection 162, and consequently assists the spring 151 in withdrawing the totalizer from engagement with
90 its driving-gears 53.

In taking a total the lever 98 is first depressed to engage the indicating and printing wheels with the totalizer, after which the crank-handle 148 is operated to return the
95 totalizer to zero and place the total in the indicating and printing disks. If the handle 148 is returned home while the trains are in mesh, the total will be placed back in the totalizer and the indicating and printing wheels
100 cleared. If it is desired to clear the totalizer, the handle 148 is operated to restore the totalizer to zero while it is out of mesh with the indicating and printing wheels.

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

1. The combination with a series of keys, of a control-bar common thereto, gravitating blocks on the several key-shanks, pins carried
110 by said gravitating blocks for effecting an engagement therebetween and the control-bar, and means for permitting an initial movement of the key-shanks before the control-bar is engaged thereby; substantially as described.

2. The combination with a series of keys,
115 of gravitating blocks arranged on the shanks thereof and forming stops for limiting the upward movement of said shanks, a notched control-bar, and pins on the gravitating blocks for coöperating with the notches in the control-bar; substantially as described.
120

3. The combination with a series of keys, of pivoted blocks mounted on the shanks thereof, a control-bar formed with obliquely-arranged notches, and pins on the blocks which
125 are received by said notches; substantially as described.

4. The combination with a series of keys, of pivoted blocks arranged on the shanks of
130 said keys, projections on said blocks, a piv-

oted control-bar common to said series and provided with a series of obliquely-arranged slots cooperating with said projections on said gravitating blocks, and adjustable stops under
 5 said projections for limiting the downward movement of the key-shank, said stops having a shouldered upper edge for cooperating with the projection on the gravitating block to lock the same in its oblique slot to prevent
 10 momentum carrying the control-bar beyond its designed limit; substantially as described.

5. The combination with a series of keys, of a control-bar cooperating therewith, item-wheels driven by said control-bar, and a horizontally-movable bar common to said series
 15 of keys for causing the item-wheels to engage with the control-bar; substantially as described.

6. The combination with a series of keys,
 20 of a control-bar cooperating therewith, item-wheels driven by said control-bar, a horizontally-movable bar common to said series of keys for causing the item-wheels to engage with the control-bar, and escapement-dogs on
 25 said bar for cooperating with the keys to effect said horizontal movement; substantially as described.

7. The combination with a series of keys, of a horizontally-movable bar common there-
 30 to, escapement-dogs on said bar, said dogs being provided with cam-faces, and pins on the key-shanks for cooperating with said cam-faces; substantially as described.

8. The combination with a series of keys,
 35 of a horizontally-movable bar common thereto, escapement-dogs pivoted to said bar, means for limiting the movement of said escapement-dogs, and means on the key-shanks for cooperating with the dogs; substantially as de-
 40 scribed.

9. The combination with a series of keys, of a horizontally-movable bar, escapement-dogs having cam-faces and pivotally mounted on said bar, stops fixed to the bar for limiting
 45 the movement of said dogs, springs for holding said dogs against one of their respective stops, and means on the key-shanks for engaging said dogs to move the bar horizontally, said means rocking said dogs; substantially as
 50 described.

10. The combination with a series of keys, of a horizontally-movable bar common thereto, pivoted escapement-dogs on the bar, pins on the key-shanks for cooperating with said
 55 dogs, and L-shaped projections on the bar for cooperating with the keys when the dogs are released; substantially as described.

11. The combination with a series of keys, of a horizontally-movable bar common there-
 60 to, escapement-dogs pivoted to said bar and having cam-faces 28, 28^a, and 28^b, and means on the key-shanks for cooperating with said cam-faces; substantially as described.

12. The combination with a plurality of se-
 65 ries of keys, of horizontally-movable bars

common to each series of keys, means for moving said bars upon the depression of any key in a series, a rock-shaft having rock-arms which bear against said bars, and yielding
 70 connections between said arms and said bars, whereby, upon the operation of any one of said bars, said rock-shaft is positively operated in one direction to place said yielding
 75 connections between the rock-arms and the other bars under tension; substantially as described.

13. The combination with a horizontally-movable bar, of a series of keys for operating the same, a rock-shaft, an arm on said shaft fitting against a shoulder on the bar, and a
 80 spring for holding said arm against said shoulder; substantially as described.

14. The combination with series of keys, of horizontally-movable bars common to the series of keys respectively, a rock-shaft, con-
 85 nections between said rock-shaft and all of said bars, a movable frame carrying item-wheels, and means operated by the rock-shaft for moving said frame whenever any of the horizontally-movable bars are actuated; sub-
 90 stantially as described.

15. The combination with a rock-shaft, of a pivoted frame, item-wheels carried by said frame, means operated by said rock-shaft for moving said frame, and a totalizer-frame which
 95 is locked against movement when the item-wheel-carrying frame is out of normal position; substantially as described.

16. The combination with a control-bar and its carried segmental gear, of item-wheels, and
 100 yielding intermediate driving-gears interposed between the segmental gear and the said item-wheels; substantially as described.

17. The combination with a control-bar and its segmental gear, of item-wheels, and a train
 105 of transmitting driving-gears interposed between the segmental gear and said item-wheels, said train comprising companion gears connected together by means which is capable of yielding when said train is being rotated; sub-
 110 stantially as described.

18. The combination with item-wheels, of a train of drivers therefor, said train comprising gears connected together by a spring, whereby
 115 one of said gears is capable of independent rotation in one direction, means for locking said gears together when rotating in the opposite direction, and mechanism for driving said train; substantially as described.

19. The combination with item-wheels, of
 120 totalizer-wheels, means for yieldingly driving the item-wheels, said means also yieldingly driving the totalizer-wheels during the operation of restoring the item-wheels; substantially as described.
 125

20. The combination with an item-train, of a driver therefor comprising companion gears connected by a yielding medium, a totalizer-
 130 train, means for engaging said totalizer-train with one of the pair of drivers, and devices

for operating said drivers, whereby their forward rotation permits of an interruption in the movement of one of them; substantially as described.

21. The combination with an item-train, of a pair of drivers therefor, a yielding connection between said drivers, means for rotating one of said drivers, which motion is transmitted through the yielding connection to the other of said drivers and thence to the item-train, a totalizer-train held out of engagement with the first-mentioned driver during the before-mentioned operation, and means for restoring the item-train, and, through the yielding connection, placing the item therein in the totalizer-train; substantially as described.

22. The combination with an item-train, of a pair of yieldingly-coupled drivers therefor, and a centering device cooperating with one of said drivers; substantially as described.

23. The combination with an item-train, of a primary driver, means for operating said driver, a secondary driver in mesh with the item-train, a yielding coupling between said drivers which permits the secondary driver to rotatively move in advance of its companion, a totalizer-train designed to mesh with the primary driver, and a centering device for said drivers; substantially as described.

24. The combination with an item-train, of a yielding driving-gear therefor, a totalizer-train designed to mesh with the driver at the completion of movement of said driver, and means for restoring the item-train and through the intermediacy of said driver actuate the totalizer-train; substantially as described.

25. The combination with an item-train, of driving-gears therefor, a yielding connection between said driving-gears, means for positively actuating one of said driving-gears and yieldingly driving the item-train, a totalizer-train, and means for engaging the totalizer-train with the item-train and yieldingly actuating the totalizer-train from said item-train; substantially as described.

26. The combination with a plurality of item-trains, of a pair of drivers for each of said trains, the drivers of the pair being yieldingly connected together, means for operating the item-trains through said drivers, a totalizer-train, and means for engaging the totalizer-train with the item-train and positively restoring the item-train to zero position and yieldingly placing the item in the totalizer-train; substantially as described.

27. The combination with a plurality of item-trains including gears 66, pins 68 and 69 on said gears, a shaft upon which said gears are mounted, and pins on said shaft which cooperate with the pins on said gears, substantially as described.

28. The combination with an item-train part of which is mounted in a movable frame, of a totalizer-train mounted in a movable frame,

said totalizer-train being adapted to drive, and to be driven by, the item-train, means for driving the item-train independently of the totalizing-train, and a lock cooperating with said movable frames, whereby, when either is in other than normal position, the other cannot be moved; substantially as described.

29. The combination with an item-train, of a totalizer-train adapted to drive, and be driven by, the item-train, means for driving the item-train independently of the totalizer-train, and means for preventing said driving mechanism from becoming operative when the totalizer-train is in engagement with the item-train; substantially as described.

30. The combination with an item-train, part of which is mounted in a movable frame, of a totalizer-train mounted in a movable frame said totalizer-train being adapted to drive, and be driven by, the item-train, means for driving the item-train independently of the totalizing-train only when the totalizer-train is out of engagement therewith, means for engaging the item and totalizing trains, and an interacting lock on the item and totalizer frames; substantially as described.

31. The combination with an item-train, of a segmental gear for restoring the same, a lever 98, a cam operated by said lever, means for permitting said lever to have an initial movement before becoming engaged with the segmental restoring-gear, a totalizer-frame, and a lever operated by said cam for actuating the totalizer-frame during the initial movement of lever 98; substantially as described.

32. The combination with an item-train, of a locking-pawl therefor, a totalizer-train normally out of engagement with the item-train, means for engaging the item and totalizer trains, and connections between said engaging mechanism and said pawl, whereby, the pawl is operated to release the item-train during the engagement of the totalizer-train therewith; substantially as described.

33. The combination with an item-train, of a locking-pawl therefor, a driving mechanism for the item-train, connections therebetween and said pawl, whereby, the pawl is disengaged from the item-train when the driving mechanism is operating, means for restoring the item-train, connections between said restoring mechanism and said pawl, whereby, the item-train is released during the operation of said restoring mechanism, a totalizer-train, means for engaging the item and totalizer trains, and connections operated by the engaging mechanism referred to for releasing the item-train while the totalizer-train is in engagement therewith; substantially as described.

34. In a totalizer-train, the combination with drivers therefor, a pair of rotatable elements in the totalizer-train, means for normally

locking said elements together, and means for unlocking said elements and advancing one of them; substantially as described.

35. The combination with drivers of a plurality of totalizer-trains including pairs of rotatable elements, means for locking said elements against independent rotation, and means for unlocking said elements and advancing one of them to drive the next adjacent train of higher order; substantially as described.

36. The combination with driving-gears, of groups of totalizer-trains, each group including a pair of independently-rotatable elements, means for yieldingly coupling said elements together, and means for advancing one of said elements beyond the other, whereby, the coupling referred to is rendered temporarily inoperative, said means also advancing the next adjacent train of higher order during the period that said rotatable elements are circumferentially displaced with respect to each other; substantially as described.

37. The combination with driving-gears, of trains of totalizers driven thereby respectively, a pair of rotatory elements included in each train, means for locking said elements together, a cam driven by said train, and means operated by said cam, for uncoupling the rotatory elements to advance one of them; substantially as described.

38. The combination with drivers, of trains of totalizers driven thereby, a pair of rotatory elements included in each train, means for locking said elements together, cams driven by the train, means operated by the cams to advance one of said rotatory elements to uncouple them, means on said cam for driving the next adjacent train of higher order while the rotatory elements are uncoupled, and means for reestablishing the coupling between said elements; substantially as described.

39. The combination with drivers, of trains of totalizer-wheels including companion disks, means for coupling said disks together, means for advancing one of said disks independently of the other for uncoupling them and permitting the next adjacent train of higher order to be actuated, and centering devices for each totalizer-train; substantially as described.

40. The combination with drivers, of totalizer-trains driven thereby, companion disks in said trains which are normally coupled together, notches in said disks, and means for advancing one of the disks beyond the other to uncouple them; substantially as described.

41. The combination with drivers, of totalizer-trains including companion disks, one of said disks having radial, and the other angularly-arranged slots in their peripheries respectively, a coupling between said disks in the form of a spring, a locking-pawl carried by one of said disks, a pin on the other of said disks for locking said pawl in position, and means for advancing one disk beyond

the other against the tension of said spring, whereby, said pawl is released; substantially as described.

42. The combination with drivers, of totalizer-trains driven thereby, companion disks in said trains, means for yieldingly coupling said disks together, a pawl carried by one of said disks and normally engaging a notched wheel, whereby, said wheel is locked to said disks, and means for advancing one of said disks to release said pawl and permit the notched wheel to be rotated, said means rotating said notched wheel when relieved from the restraining influence of said pawl; substantially as described.

43. The combination with drivers, of trains of totalizer-wheels including a pair of rotatable elements, a cam for actuating the next adjacent wheel of higher order, a bell-crank lever operated by said cam, and means on said bell-crank lever for advancing one of the rotatable elements beyond the other during the period that the train of higher order is being operated; substantially as described.

44. The combination with item and totalizer trains, means for engaging the same, carrying devices for operating next adjacent totalizer-trains of higher order when the item-trains act as drivers for the totalizers, and means for reversely rotating the totalizer-trains to drive the item-trains; substantially as described.

45. The combination with a driver, of coupled totalizer-trains, means for locking and unlocking said coupling, and means for advancing one train beyond the other while uncoupled; substantially as described.

46. The combination with drivers, of totalizer-gear trains, each of which is provided with a coupling extending to the next adjacent train, and means for cooperating with said coupling to advance one train beyond the other; substantially as described.

47. The combination with a driver, of two disks concentrically movable with respect to each other, a centering-wheel, a pawl on one disk, a locking-surface for the pawl on the other disk, and means for rotating said disks with relation to each other; substantially as described.

48. The combination with a plurality of drivers, a plurality of totalizer-trains, each train having two disks concentrically movable with respect to each other, a centering-wheel, means carried by said disks for locking said centering-wheel, means for unlocking said centering-wheel, a gear-wheel connected to said centering-wheel, and means for advancing said gear-wheel with respect to the disks; substantially as described.

49. The combination with a plurality of drivers, of a plurality of totalizer gear-trains, a pair of disks in each train, means for locking said disks together, a cam, a lever which is operated at each revolution of the cam, and

means for rotating the disks of a pair with respect to each other when said lever is operated; substantially as described.

50. The combination with a plurality of drivers, of a plurality of totalizer-trains, a pair of disks in each of said trains, a centering-wheel adjacent said disks, means for locking said centering-wheel, a gear-wheel conjoined to the centering-wheel, means for rotating said gear, and means for advancing one portion of each train beyond the other portion thereof; substantially as described.

51. The combination with a plurality of drivers, of a plurality of totalizer gear-trains, a pair of disks in each of said trains, a cam for each train, levers operated by said cams for cooperating with an adjacent train, and means for rotating the members of the pair of disks relative to each other, said means being connected to said levers; substantially as described.

52. The combination with a keyboard, of type-wheels for printing items and totals thereof, gear-trains connecting the type-wheels with the keyboard, said gear-trains being normally disconnected from the keyboard, means for connecting the said gear-trains with the keyboard upon the operation of keys, and independent means for rotating the gear-trains upon the operation of said keys; substantially as described.

53. The combination with a keyboard, of type-wheels for printing items and totals thereof, gear-trains for connecting the type-wheels to the keyboard, said gear-trains being normally disconnected therefrom, means, operated by the keys, for connecting the trains with the keyboard, independent means for moving the trains and advancing the type-wheels, and means for returning the trains and type-wheels to normal position; substantially as described.

54. The combination with a keyboard, of type-wheels for printing items and totals thereof, trains connected with said type-wheels, means for rotating said wheels upon the operation of the keys, means for restoring said wheels and their connected trains to normal position, a totalizing mechanism, and means for accumulating the items therein upon the restoration of the type-wheels; substantially as described.

55. The combination with a keyboard, of type-wheels for printing the items and totals thereof, means for operating said wheels from the movement of the keys, means for restoring said wheels to zero position, a totalizing mechanism, means for accumulating the items in the totalizer by the return movement of the item devices, and means for operating the key-controlled mechanism to indicate the total of the items in the printing-line of the type-wheels; substantially as described.

56. The combination with type-wheels and their means of operation, of a totalizing mechanism

comprising a plurality of trains, means for operating one train from the other to accumulate the items in the totalizer, means for arresting the totalizing mechanism in its movement, and means for regaining the lost movement; substantially as described.

57. The combination with item printing and indicating wheels and their connected trains, of spring-connected drivers therefor, means for returning said trains to normal position and accumulating the items in a totalizing mechanism, and a totalizing mechanism; substantially as described.

58. The combination with item indicating and printing wheels and their connected trains, of a totalizing mechanism normally disconnected from said trains; means for returning the item-trains to normal position when the totalizing mechanism is disconnected therefrom, and means for returning the item mechanism to normal position when the totalizing mechanism is connected thereto, thereby accumulating the items in the totalizer; substantially as described.

59. The combination with item-registering devices and totalizing-trains, said registering devices including printing-wheels, of means for operating the totalizing-trains from the item-trains, whereby, the backward movement of said item-trains places the item in the totalizer, and means for driving the item-trains from the totalizer-trains in a reverse direction to indicate the total of the items therein, such operation of the totalizing mechanism returning it to zero position; substantially as described.

60. The combination with a series of keys, a control-bar common thereto, a stop carried by each key to limit the movement of the control-bar, a type-wheel, a gear-train for operating the type-wheel, a sliding bar common to the series of keys, means on said keys for operating said bar, devices controlled by the sliding bar for connecting the gear-train to the control-bar, means for disconnecting the gear-train from the control-bar before the elevation of the depressed key, and means for advancing the type-wheels by the operation of the control-bar; substantially as described.

61. The combination with a series of depressible keys, of a segmental gear operated thereby, a type-wheel, a gear-train therefor, a sliding bar common to the series of keys, means on the keys for operating said bar whenever any key in the series is depressed, means for connecting the gear-train with the segmental gear upon the operation of the sliding bar, and means for disconnecting said gear-train from the segmental gear before the elevation of the depressed key; substantially as described.

62. The combination with a totalizing mechanism consisting of a series of trains of wheels, means for locking the wheels of each train against independent rotation, means operated

by one train for unlocking the wheels of an adjacent train, means for effecting a relative concentric movement of the wheels in the unlocked train, an item mechanism, and means
5 for accumulating the items in the totalizer by the movement of said item mechanism; substantially as described.

63. The combination with an item mechanism, of a totalizer composed of a series of adjacent trains of wheels, means for normally
10 locking the wheels of each train, means for unlocking said wheels in the operation of the totalizer, means for advancing one portion of the unlocked train beyond the other portion,
15 and means for driving the totalizer from the item mechanism; substantially as described.

64. The combination with an item mechanism, of a totalizer composed of trains of wheels, means for normally locking the wheels
20 of each train together, suitable lever connections between the different trains to effect the carrying from one train to the next adjacent train of higher order, and means for accumulating the items in the totalizer by the move-
25 ment of the item mechanism; substantially as described.

65. The combination with an item mechanism, of a totalizer composed of trains of wheels, a lock in each train for locking the
30 wheels thereof together, means for driving the trains from the item mechanism to accumulate the items therein, and means for unlocking the trains at intervals; substantially as described.

66. The combination with type-wheels, of spring-held gears for controlling the same, means for returning said gears to normal position after each operation, a cam controlled
40 by said means, a totalizer normally disconnected from said gears, means operated by the cam for connecting the totalizer with the gears, and means for disconnecting said parts after each operation; substantially as described.

67. The combination with a keyboard, of type-wheels for printing the items and the total thereof, trains of gears for connecting the type-wheels to the keyboard, means for establishing such connection upon the operation of
50 the keys and moving the type-wheels so that the item will appear in the printing-line thereof, means for disconnecting the item-trains from the keyboard, and means for accumulating the items and presenting the total thereof in the printing-line of the type-wheels; substantially as described.
55

68. The combination with control-bars having slots formed therein, of keys, pivoted blocks carried by said keys and operating in
60 said slots to regulate the movement of the said bars, stops in the paths of said blocks to stop the keys, type-wheels, and means for advancing said type-wheels when the control-bars are moved; substantially as described.

69. The combination with a keyboard, of

type-wheels, spring-held gears interposed between the keys and type-wheels, and normally disconnected from the keyboard, sliding bars operated by the keys for connecting the gears with the keyboard, and escapements carried
70 by said sliding bars for releasing the gears from the keyboard before the elevation of the operating-key; substantially as described.

70. The combination with control-bars having slots formed therein, of keys for operating
75 said control-bars, blocks pivoted to said keys and operating in said slots to regulate the movement of the said control-bars, adjustable stops to limit the movements of the keys, type-wheels, means for advancing said type-
80 wheels, and means for returning them to normal position; substantially as described.

71. The combination with control-bars, of keys for operating said control-bars, blocks pivoted to said keys for controlling the move-
85 ment of the said bars, type-wheels, and spring-held gears interposed between said control-bars, and type-wheels for operating the latter; substantially as described.

72. The combination with type-wheels, of
90 spring-held gears for controlling said type-wheels, control-bars for operating said gears, keys adjacent to said control-bars, blocks pivoted to said keys for controlling the control-bars, and suitable stops in the paths of said
95 blocks, substantially as described.

73. The combination with type-wheels, of spring-held trains of gears for controlling said type-wheels, control-bars for operating said
100 gears, keys adjacent to said control-bars for moving them, and means carried by said keys for limiting the movement of the control-bar; substantially as described.

74. The combination with type-wheels, of spring-connected gears for driving the same,
105 a keyboard, and means operated by the keys for rotating the spring-connected gears and the type-wheels; substantially as described.

75. The combination with type-wheels, of a keyboard, spring-connected gears interposed
110 between the keyboard and the type-wheels and normally disconnected from the keyboard, and means operated by the keys for connecting the gears with the keyboard, for advancing the keys and the type-wheels; substan-
115 tially as described.

76. The combination with item and totalizing mechanisms normally disconnected, of means for connecting said mechanisms and actuating the totalizing mechanism from the
120 item mechanism to place the item in the totalizer, and means for positively operating the item mechanism from the totalizer to exhibit the total of the items in the item mechanism; substantially as described.
125

77. The combination with item and totalizing mechanisms normally disconnected, of segmental gears, means for operating said gears and connecting them with the item mechanism, means for connecting the totalizer with
130

the item mechanism when the segmental gears are disconnected therefrom, and means for reversely rotating the item mechanism to accumulate the items in the totalizer; substantially as described.

78. The combination with item and totalizing mechanisms normally disconnected, means for operating the item mechanism independently, a segmental gear, means for operating said gear to clear the item mechanism, said means connecting the item and total mechanisms to accumulate the items in the latter by the clearing action of the former, and means for driving the item mechanism from the totalizer to exhibit the condition of a total in said item mechanism; substantially as described.

79. The combination with a series of keys, of a control-bar common thereto, and means for locking the control-bar to the actuated key when said key is at the limit of its downward movement; substantially as described.

80. The combination with a series of keys, of a control-bar common thereto, a pivoted block on each key-shank for cooperating with the control-bar, and means cooperating with said pivoted block to lock the same to the control-bar when the actuated key is in its lowermost position; substantially as described.

81. The combination with a depressible key, of a pivoted block carried thereby, a control-bar with which said block cooperates, and a stop for limiting the depression of said key, said stop engaging the pivoted block and locking the same to the control-bar; substantially as described.

82. The combination with a depressible key,

of a pivoted block having a projection, a control-bar having an oblique slot whose open end is in the path of said projection when the key is in its elevated position, a stop in the path of said projection, and means on said stop for locking said projection in the slot of the control-bar, when said key is depressed; substantially as described.

83. The combination with a depressible key, of a gravitating block pivotally carried thereby, a guide for the key which cooperates with the block when the key is elevated to set the block in proper position, a projection carried by said block, a control-bar having a slot normally in the path of said projection, and a stop having an inclined shoulder which forces said projection laterally and locks the same to the control-bar when the key is depressed; substantially as described.

84. In a computing-machine, the combination with a series of item-wheels on which the items are initially set up, of a series of totalizing-wheels, means for moving the totalizer-wheels radially as a gang into operative relation with the item-wheels, after the items have been set up in the item-wheels, and means for accumulating the items in the totalizer by reversely rotating the item-wheels; substantially as described.

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

CHARLES STAHLBERG.

Witnesses:

EDWARD E. LONGAN,
JOHN D. RIPPEY.