

No. 766,142.

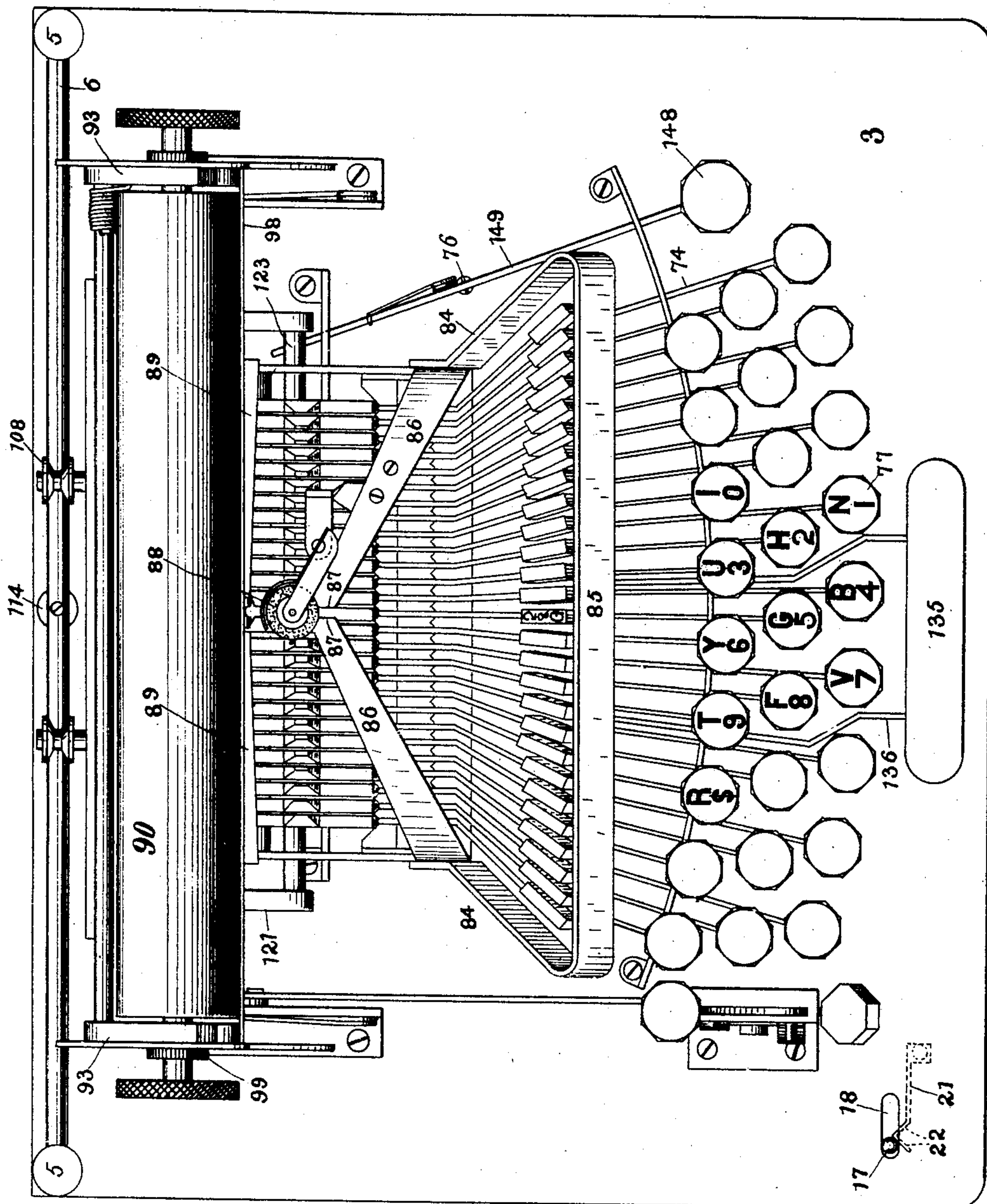
PATENTED JULY 26, 1904.

E. FITCH.  
ADDING MACHINE.

APPLICATION FILED APR. 6, 1899.

NO MODEL.

6 SHEETS—SHEET 1.



WITNESSES:

*H. H. Steele*  
*E. M. Wells*

*Fig. 1.*

INVENTOR

*Eugene Fitch*

*by Jacob Felbel*  
HIS ATTORNEY

No. 766,142.

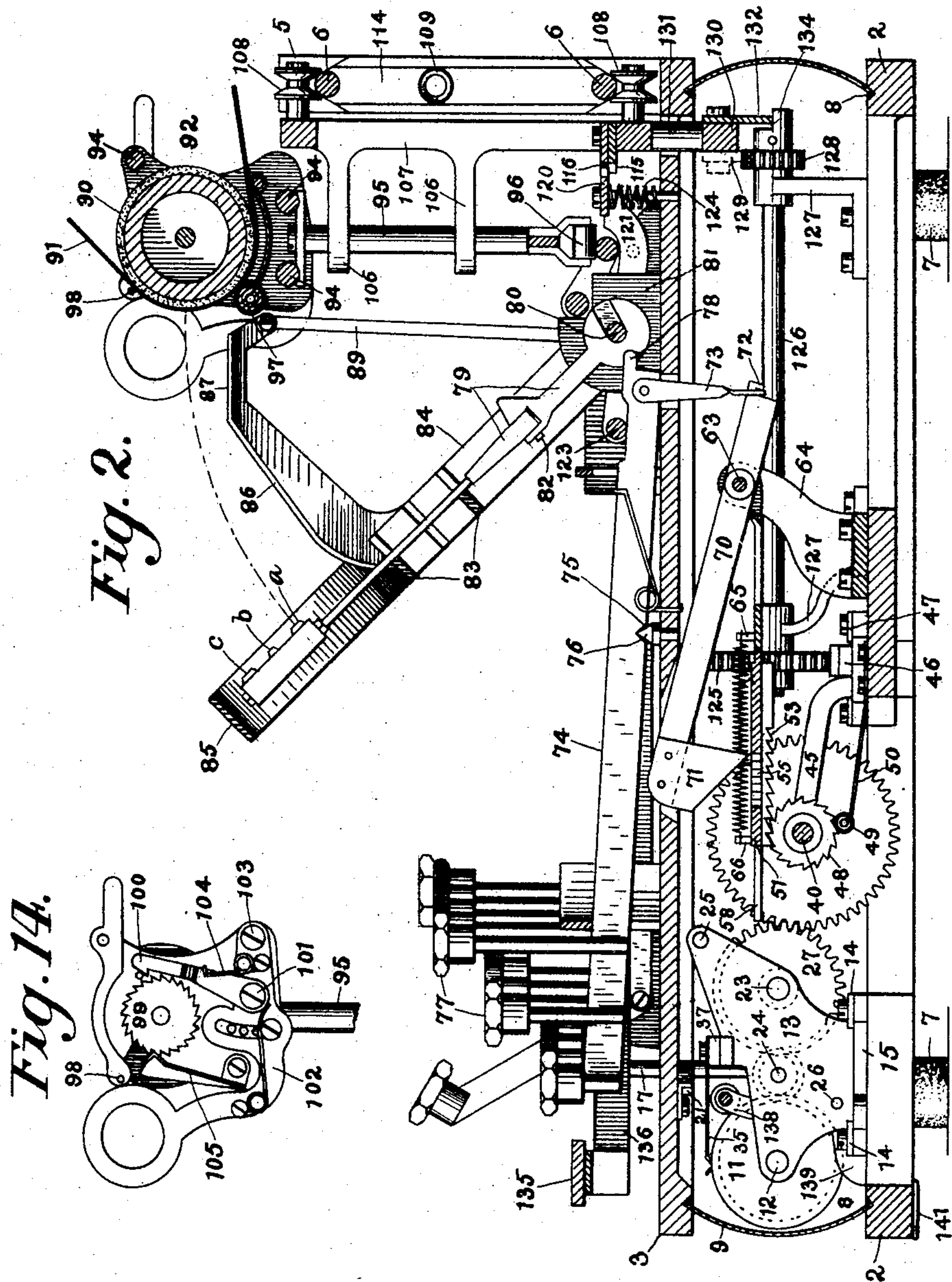
PATENTED JULY 26, 1904.

E. FITCH.  
ADDING MACHINE.

APPLICATION FILED APR. 6, 1899.

NO MODEL.

6 SHEETS—SHEET 2.



WITNESSES:

H. H. Steele  
E. M. Wells

INVENTOR

Eugene Fitch

by Jacob Felbel

HIS ATTORNEY



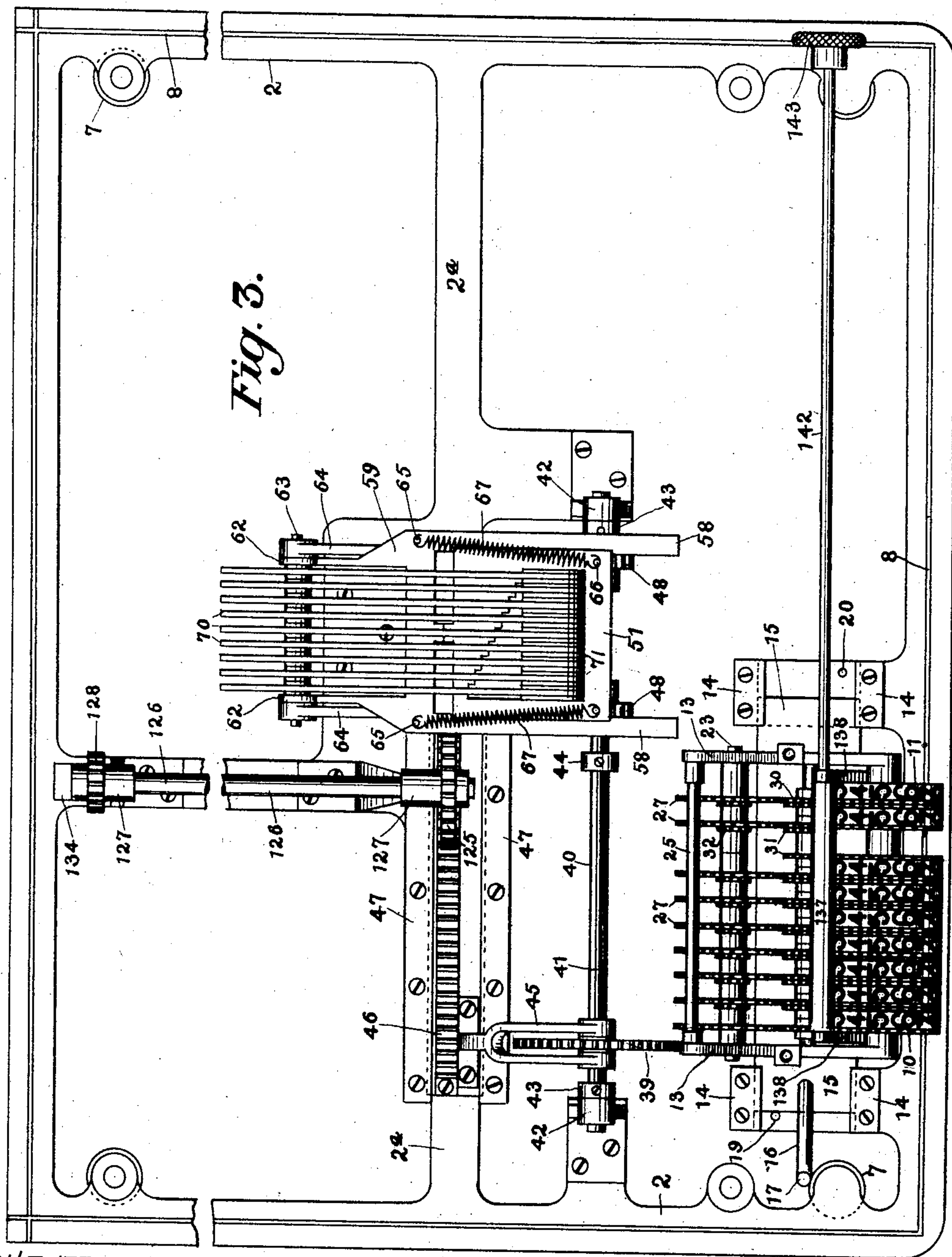
No. 766,142.

PATENTED JULY 26, 1904.

E. FITCH.  
ADDING MACHINE.  
APPLICATION FILED APR. 6, 1899.

NO MODEL.

6 SHEETS—SHEET 3.



WITNESSES:

*H. H. Steele*

*E. M. Wells*

INVENTOR

*Eugene Fitch*

*by Jacob Felbel*

THIS ATTORNEY

No. 766,142.

PATENTED JULY 26, 1904.

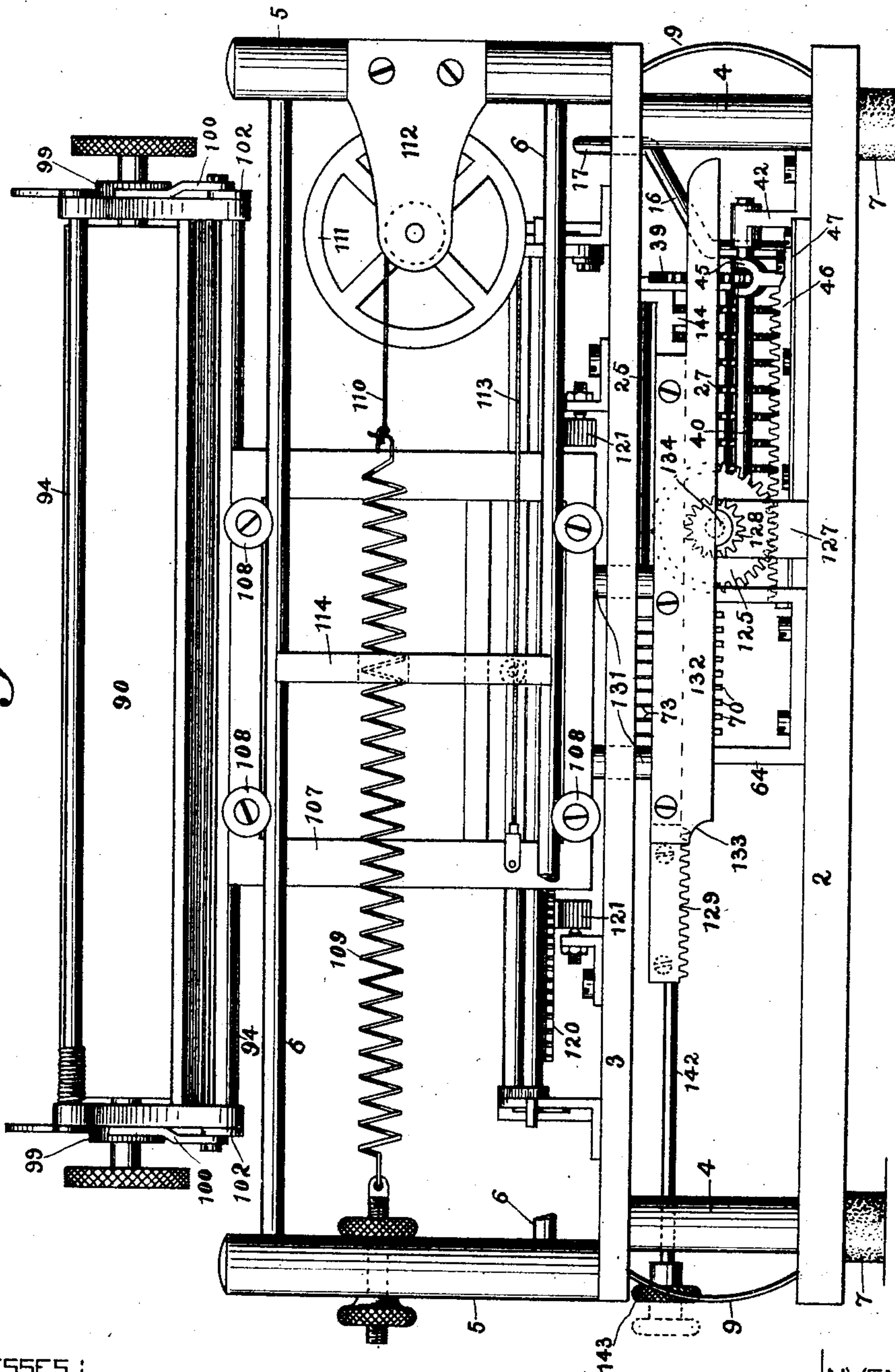
E. FITCH.  
ADDING MACHINE.

APPLICATION FILED APR. 6, 1899.

NO MODEL.

6 SHEETS—SHEET 4.

Fig. 4.



WITNESSES:

H. H. Steele.

E. M. Keller.

INVENTOR

Eugene Fitch,

By Jacob Felbel

HIS ATTORNEY

E. FITCH.  
 ADDING MACHINE.  
 APPLICATION FILED APR. 6, 1899.

NO MODEL.

6 SHEETS—SHEET 5.

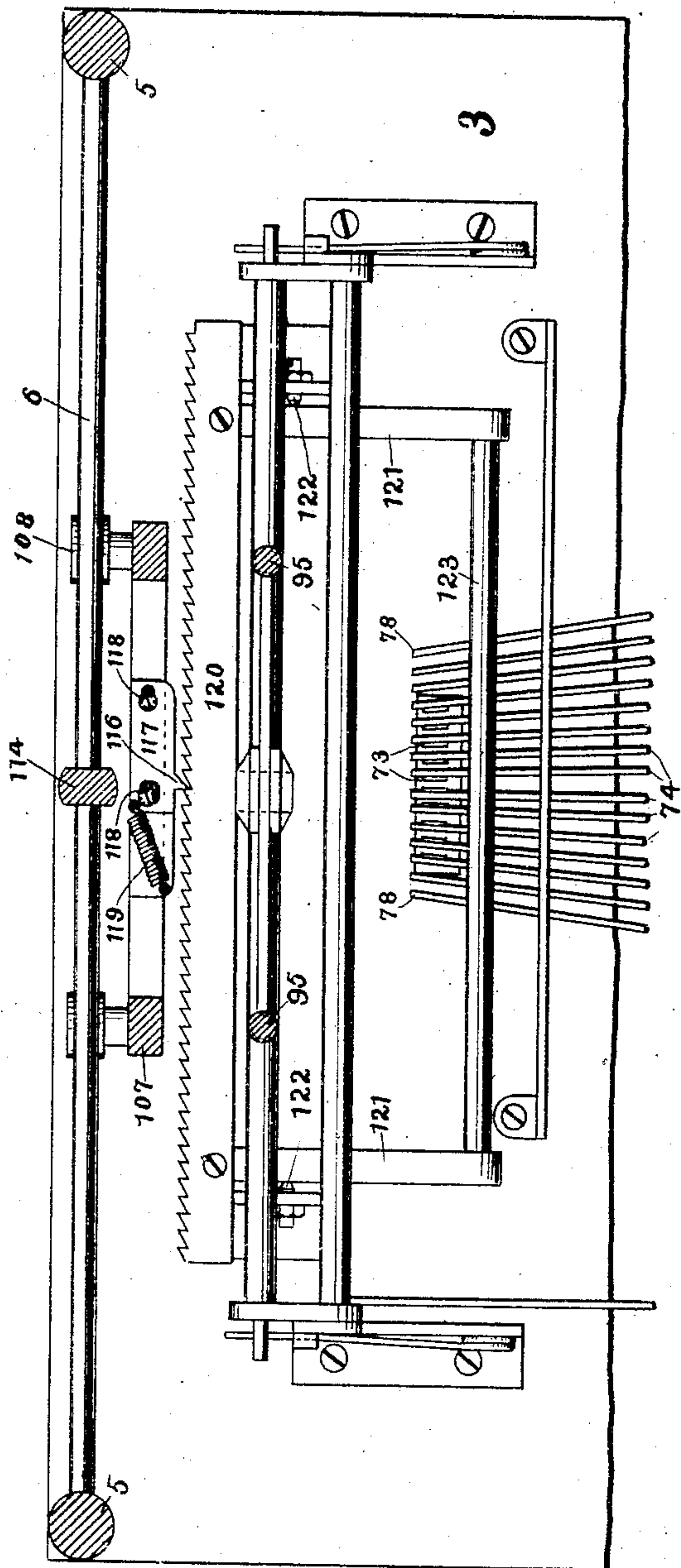


Fig. 5.

WITNESSES:

*H. H. Steele.*  
*E. M. Mills.*

Fig. 12.

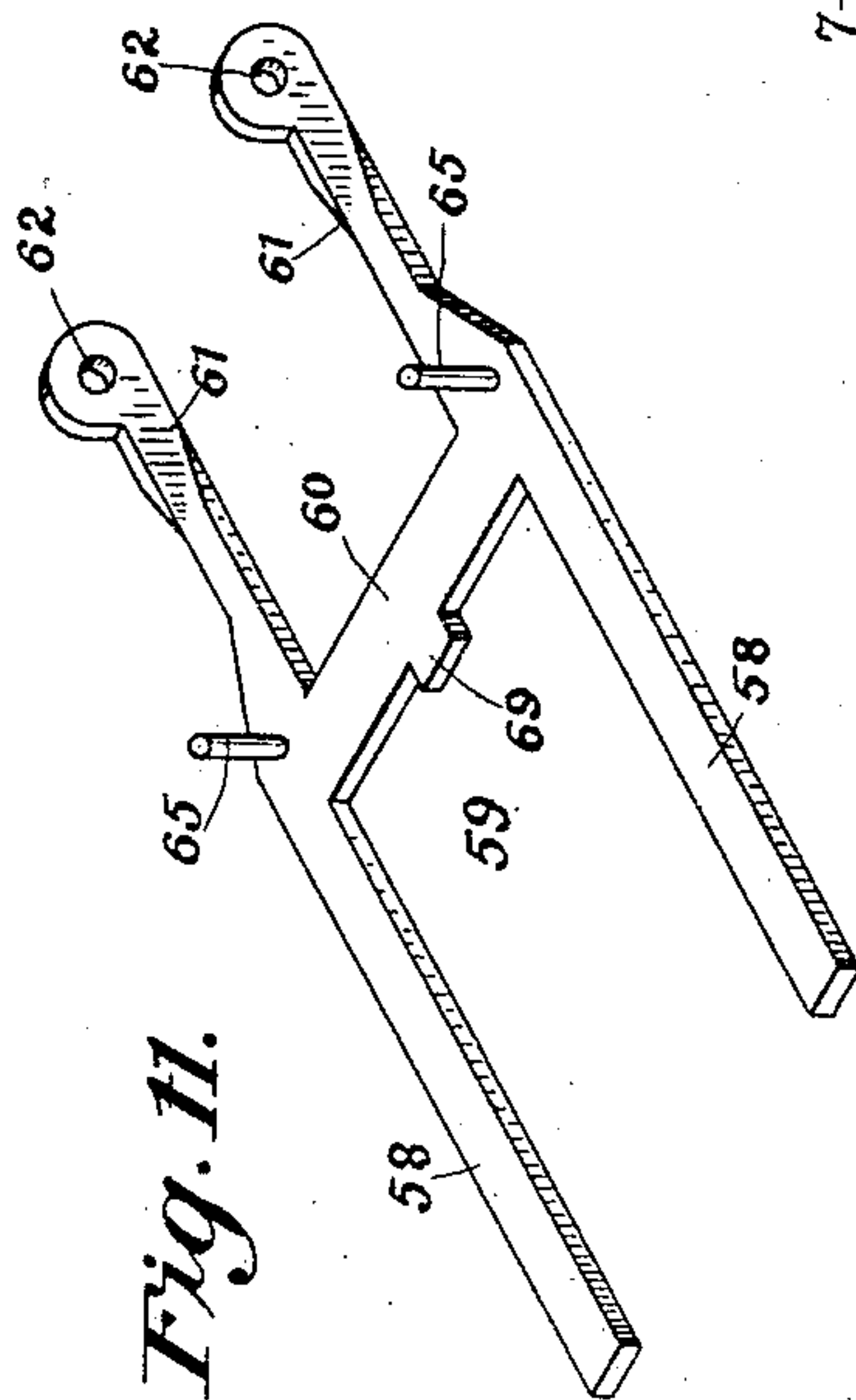
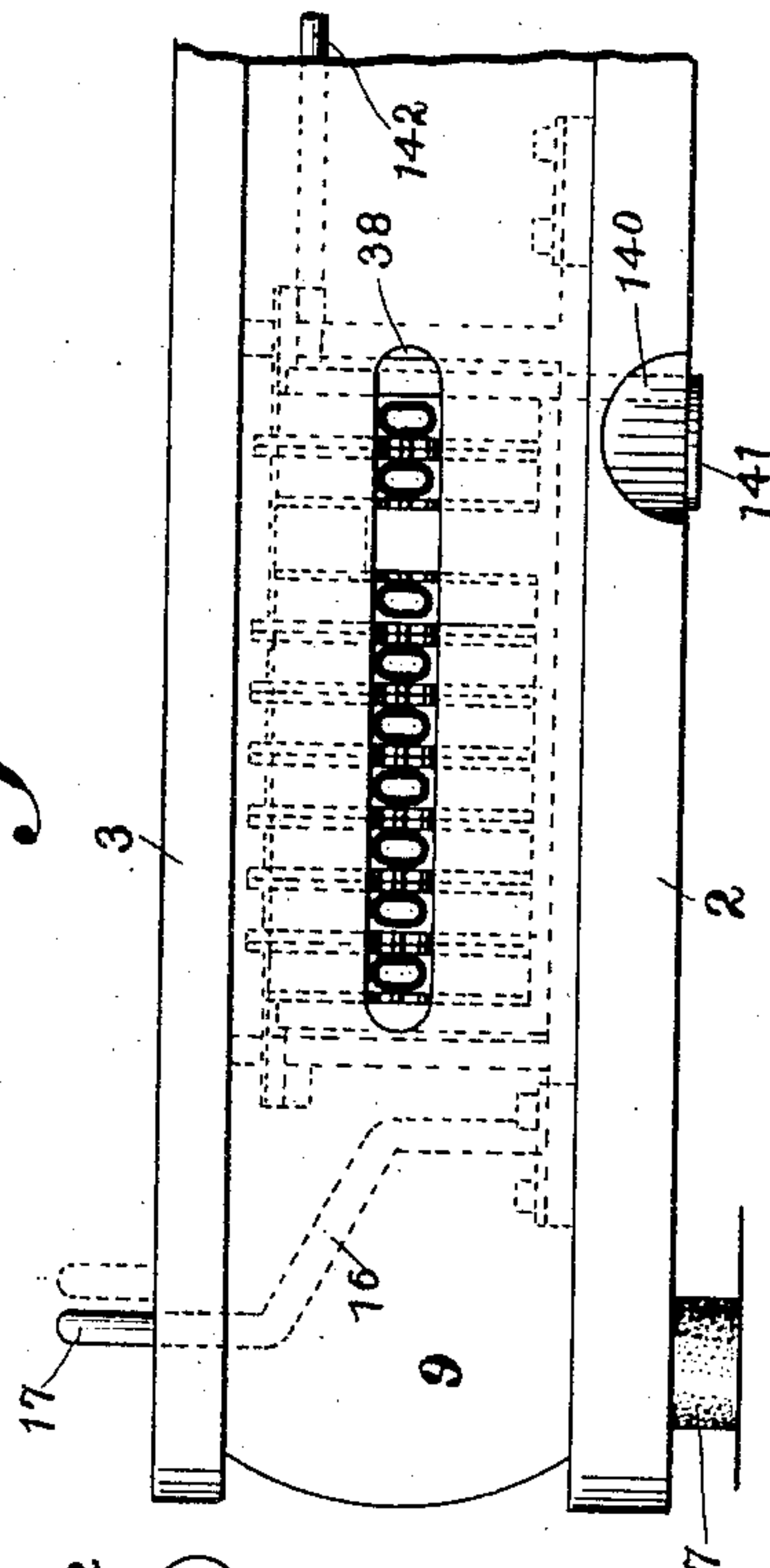


Fig. 11.

INVENTOR

*Eugene Fitch*

By *Jacob Felbel*

HIS ATTORNEY

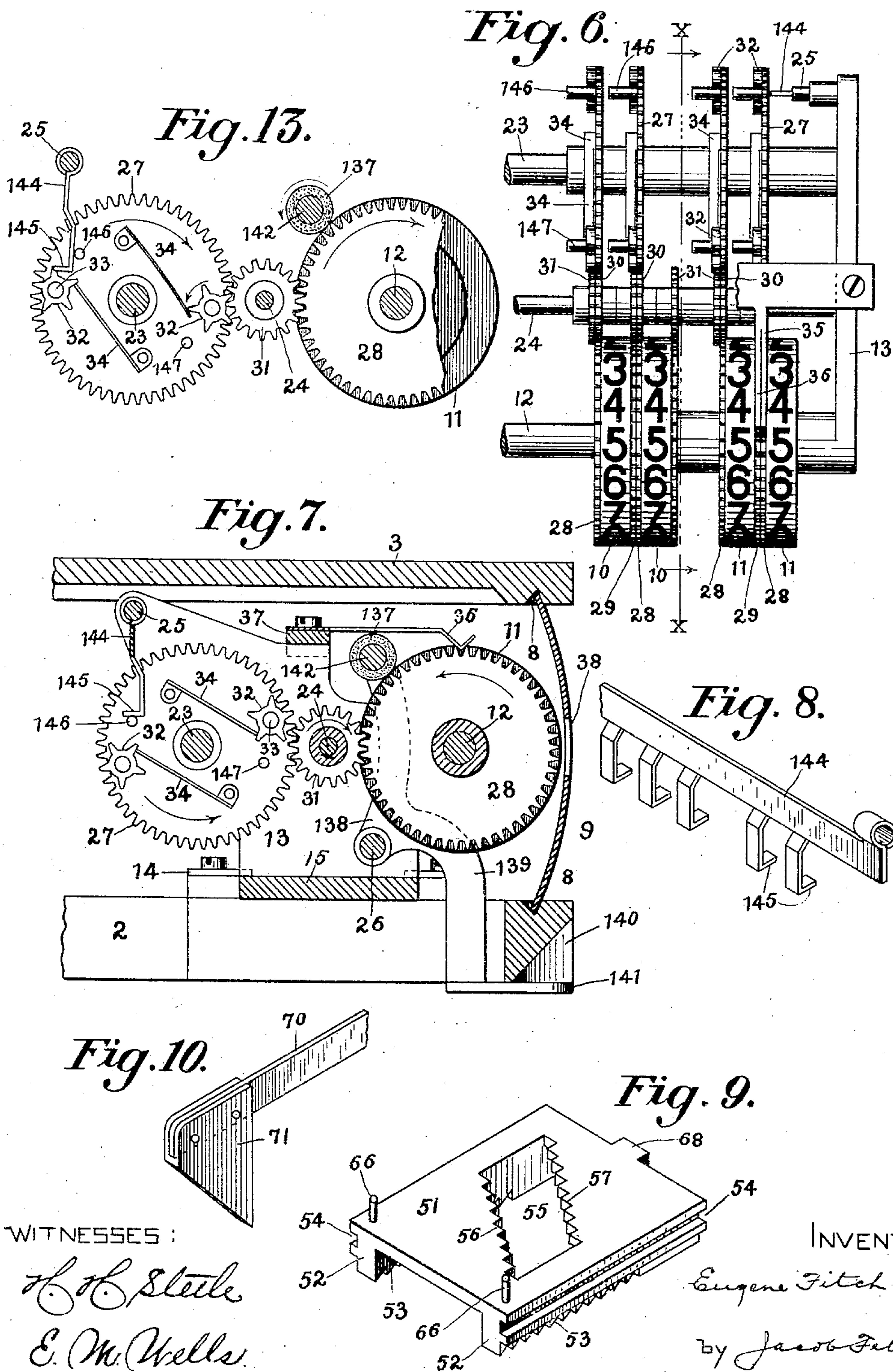


E. FITCH.  
ADDING MACHINE.

APPLICATION FILED APR. 6, 1898.

NO MODEL.

6 SHEETS—SHEET 6.





# UNITED STATES PATENT OFFICE.

EUGENE FITCH, OF ASTORIA, NEW YORK, ASSIGNOR TO THE UNION TYPE-WRITER COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## ADDING-MACHINE.

**SPECIFICATION** forming part of Letters Patent No. 766,142, dated July 26, 1904.

Original application filed November 26, 1898, Serial No. 697,505. Divided and this application filed April 6, 1899. Serial No. 712,035. (No model.)

*To all whom it may concern:*

Be it known that I, EUGENE FITCH, a citizen of the United States, and a resident of Astoria, city of New York, in the county of Queens and State of New York, have invented certain new and useful Improvements in Adding-Machines, of which the following is a specification.

The present application is a division of my prior application filed in the United States Patent Office on the 26th day of November, 1898, and serially numbered 697,505.

Certain features relating to type-writing machines and herein illustrated and described form the subject-matter of claims in an application filed April 3, 1899, and numbered 711,593, which is also a division of my said application No. 697,505.

The present invention relates primarily to adding-machines, the main object of the invention being the provision of a comparatively simple, practical, and effective adding mechanism. Another object of the invention is to record the sum of the column without disturbing or actuating the adding mechanism. Another object is to correct an error in the record or to repeat a number or digit to print it more legibly without operating or actuating the adding mechanism. Another object is to return the number-carriers of the adding mechanism to an initial position, as that in which the naughts are in line, and so as to have the mechanism in readiness for reuse. Another object is to operate a series of number-wheels or number-carriers one at a time or in succession from a single set of finger-keys which preferably control a set of type for recording the numbers selected, and other objects, as will hereinafter more fully appear.

To these ends the invention includes features of construction and combinations of devices hereinafter described, and more particularly pointed out in the appended claims.

The preferred form of the invention is illustrated in the accompanying drawings, forming part of this specification, in which—

Figure 1 is a plan view of a machine in

which the invention is embodied. Fig. 2 is a central vertical longitudinal sectional view. Fig. 3 is a plan view of the mechanism beneath the top plate shown in Fig. 2. Fig. 4 is a rear elevation of the machine. Fig. 5 is a plan view, partly in section, of the carriage-escapement mechanism. Fig. 6 is a plan view of part of the number-carriers and their actuating mechanism. Fig. 7 is a sectional view on the plane indicated in Fig. 6 by the line X X and looking in the direction of the arrows thereat. Figs. 8, 9, 10, and 11 are detail perspective views of various parts. Fig. 12 is a front elevation of the left-hand side of the frame of the machine and showing the number-carriers with their naughts opposite a slot in the casing. Fig. 13 is a diagrammatic view illustrating the operation of certain parts of the mechanism, and Fig. 14 is a view illustrating the line-feed mechanism.

In the various views the same part will be referred to by the same reference numeral or character.

The framework comprises two parallel horizontal frames or plates 2 3, connected by uprights 4, and two standards 5, rising at the rear of the upper frame or plate 3 and connected by parallel horizontal rods or tracks 6, and various brackets or studs, as will appear more fully hereinafter. The frame 2 is provided with feet 7 for the usual purposes. The frames 2 and 3 are provided with grooves 8, into which metal or hard-rubber plates 9 are sprung for the purpose of inclosing the space between these two frames or plates.

Inasmuch as this application is a division of an application in which both adding and type-writing mechanisms were shown and described, the drawings herein necessarily show much that is claimed in one or the other of my aforesaid applications, and the description hereinafter must also necessarily refer to much that is claimed in the said applications. With this understanding then the description of devices shown in the drawings will be proceeded with.

The adding mechanism includes a series of number-carriers 10, representing whole numbers, and two number-carriers 11, represent-



ing two places of decimals, and the said sets of carriers 10 and 11 are shown as separated from each other by a distance equal to the combined width of one of said number-carriers 10 and the two gears secured thereto, thus providing an interval corresponding to the decimal-point or for a ruled line when the numbers added are also recorded. The drawings show seven of the number-carriers 10 and two number-carriers 11; but I do not limit myself to these numbers, since a greater or a lesser number may be used. The number-wheels are loosely mounted upon a shaft 12, journaled in brackets 13, mounted upon the frame 2 to have a motion relatively thereto in the direction of the length of the shaft 12. Such motion is conveniently obtained by means of guides 14, which overhang a plate 15, to which the brackets 13 are fast. The plate 15 is provided with an arm 16, terminating in a handpiece or knob 17, which projects through a slot 18 in the plate 3 and by means of which the plate 15 and the parts supported thereby may be shifted back and forth for a purpose presently to appear. The to-and-fro motion of the plate or carriage 15 is limited by fixed stops 19 and 20, attached to the plate or frame 2 and standing in the path of the plate 15. A spring 21, having a V-shaped end 22, is secured to the under side of the plate 3, and the V 22 is adapted to coact with the thumb-piece 17 to hold the same and the plate 15 securely but yieldingly against one or the other of the stops 19 20. The brackets 13 are also provided with three shafts 23 24 26, parallel to shaft 12, and are tied together by a tie-rod 25. The brackets 13, plate 15, and tie-rod 25 form a rigid frame or carriage for the number-carriers and certain of the operating mechanism therefor. The shaft 23 has a series of toothed wheels or spur-gears 27 journaled thereon independently of each other, there being one such gear 27 for each of the number-carriers 10 and 11. The number-carriers 10 11 are each provided with a gear 28 fast thereto, and the gears 27 28 are arranged in the same planes. The number-wheels, except the right-hand wheel 11, are also provided with gears 29 fast thereto on their other sides, whence it comes that the gear 28 of one number-wheel is next or adjacent to the gear 29 of the number-wheel next or adjacent to it. The shaft 24 has a series of pinions 30 independently journaled thereon, said pinions 30 acting to transmit motion from the gears 27 to the gears 28, and so to the number-wheels 10 11. The pinions 30 have alongside them independent pinions 31, likewise journaled on the shaft 24 and meshing with the gears 29 on the number-wheels.

Each gear 27, excepting the extreme left-hand one, is provided with two pinions 32, independently pivoted thereto by pins 33 at opposite sides of the shaft 23 and in the plane of the adjacent pinion 31, the said pinions 32

being adapted to mesh with the said pinion 31 during the rotation of the gears 27. The pinions 32 are adapted to yield or turn freely in one direction. This is obtained by means of springs 34, secured to the gears 27 at one end and of a length sufficient to act as detents in conjunction with the teeth of the pinions 32. The manner in which said springs 34 act as detents is indicated in Fig. 7 and the manner in which the pinions 32 are permitted to rotate in one direction is indicated in Fig. 13, where a spring 34 bears upon a tooth of pinion 32, which rotates in the direction of the arrow, thus flexing the spring aside until the tooth passes its end, when it snaps in behind the tooth ready to act as a detent. The relative positions of the number-wheels, the gears fast thereto, the gears 27, pinions 30 31, and springs 34 are such that the carrying is from the number-wheel of lower denomination to the wheel of higher denomination—that is to say, the rotation of the units-wheel, for example, to or past the zero is transmitted, by means of the gear 28, pinion 30, gear 27, pinions 32, 31, and 29, to the tens-wheel; but the movement of the tens-wheel to or beyond the zero is not transmitted to the units-wheel, since the pinion 32, which at that time may be in mesh with the corresponding pinion 31, turns idly on its pivot—that is, it does not rotate its gear 27, which carries it. Two pinions 32 are shown upon each of the pinions 27, except the extreme left-hand one, for the reason that the number-wheels are provided each with a duplicate set of numbers, which occupy a semicircumference of the wheel. It is obvious that but one set of digits may be placed upon each number-wheel, in which case one of the pinions 32 on gear 27 may be dispensed with, and also that more than two sets of digits may be placed upon the circumference of each of the number-wheels, in which case a corresponding number of pinions 32 and springs 34 would be employed.

It is obvious that I may operate number-bearers of other forms in lieu of the number-wheels 10 11 without change in the driving mechanism shown. For the purpose of preventing accidental displacement of the number-wheels detents 35 36, formed integrally with or attached to a bar 37, which is secured to the top of the brackets 13, are provided. The said detents 35 36 respectively engage the gears 28 and 29, as shown in Fig. 6. The plate 9 in front of the number-wheels is provided with an elongated slot 38, through which the numbers giving the summation of the addition are visible.

In my said application filed November 26, 1898, Serial No. 697,505, the adding mechanism by preference is not intended to be used or brought into operation until near the end of a line of writing across the page and not even then unless it is so desired and a suitable adjustment of parts is desired. In the machine



illustrated in the accompanying drawings and also in the application aforesaid there is provided a mechanism which is adapted to engage the gears 27 in succession or one by one, beginning at the left-hand side in Fig. 3, and to rotate the same when any one of the keys carrying the numerals "1" to "9" is struck and provided that the gears 27 are in position during the step-by-step movement of said driving mechanism to be turned thereby. The said driving mechanism for operating the gears 27 is provided with a spur-gear 39 for engagement with the said gears 27 when the latter are in the positions shown at Fig. 3; but should the slide or carriage 15 be moved against the stop-pin 20 the gear 39 would in its step-by-step movements from left to right come opposite the intervals between the gears 27, and so fail to turn the same even if any of the said keys should be operated, thus rendering the adding mechanism inoperative for the time being. The mechanism whereby the said gear 39 is rotated to a greater or less extent will be described next. The gear 39 is mounted upon a shaft 40 to move endwise thereof and is connected to the shaft by means of a spline 41, whereby the gear must rotate with the shaft. The shaft 40 is journaled in standards or lugs 42, which rise from the base-frame 2, and the shaft is held against endwise motion in said lugs by means of collars 43, secured thereto and abutting against the inner sides of the lugs 42, as shown in Fig. 3. The shaft 40 is also provided with a third collar 44, adjustably secured thereto for stopping the motion of the pinion 39 toward the right-hand side of the machine. The pinion 39 is held between the branches of a fork 45, the ends of which are provided with perforations to receive the shaft 40. The fork 45 is rigidly connected with a carriage-rack 46, extending parallel with the shaft 40 and movable endwise under the guides 47, attached to a cross-bar 2<sup>a</sup> of the frame 2, and the carriage is moved in a manner hereinafter to be described. The shaft 40 is provided with ratchet-wheels 48, fixed thereto and held against accidental motion by one or more detent-rollers 49, journaled at the end of a spring or springs 50, secured to the said cross-bar 2<sup>a</sup>. Lying above the shaft 40 and ratchets 48 is a frame or plate 51, having two downwardly-extending flanges 52, provided with ratchet-teeth 53, adapted to engage with the ratchet-wheels 48. The flanges 52 are provided with grooves 54 on their sides for a purpose presently to appear, and the plate 51 is provided with an oblique slot 55, whose front and rear edges are formed in steps 56 57. The grooves 54 are adapted to receive arms 58, forming part of a guide or carrier 59, which comprises said arms 58, a cross-bar 60 uniting them, and two rearwardly-extending arms 61, provided with eyes 62, by means of which the said frame 59 is pivoted upon a

rod or shaft 63, secured in standards 64, rising from the said cross-bar 2<sup>a</sup>. The frame 59 is provided with two pins 65 at the upper side thereof, and the frame 51 is provided with similar pins 66, and two coiled springs 67 are hooked over the pins 65 66 in pairs, as shown in Fig. 3, and the tension of the springs is such that the plate 51 is normally held or drawn toward the rear of the machine to bring the lug 68 thereon against a stop-lug 69 on the cross-bar 60 aforesaid, and the inclination of the ratchet-teeth 53 and 48 is such that the frame 51 may move freely toward the rear of the machine.

The rod 63 aforesaid also affords fulcrum for nine levers 70, extending longitudinally of the machine and provided at their forward ends with downwardly-extending plates 71, whose front and rear edges are parallel and whose underneath edges are inclined upwardly and forwardly of the machine, as shown at Figs. 2 and 10. The said cam-plates 71 are arranged in line parallel with the shaft 40, and their front and rear edges are at distances apart equal to the distances corresponding to the stops 56 57 in the plate 51 and permitting of relative motion of the cams and stops. At their rear ends the levers 70 are provided with hooks 72 for engagement with links 73, whose upper ends are pivotally connected with key-levers 74. The said levers 74 are provided at their under edges with notches 75 for engagement with fulcrum-pins 76, inserted in holes in the top plate 3, and the said levers are provided at their forward ends with finger-pieces 77. As shown in Fig. 1, certain of these keys 77 are provided with the ten digits and the dollar-mark, and it is noted that other symbols used in recording may be placed upon other keys, if desired. At their rear ends the keys 74 are provided with fingers 78 for engagement with notches in the hub of the jointed type-bars 79, which are pivoted upon the rod 80, mounted in lugs 81 on the top plate 3. The type-bars 79 shown in the drawings are provided each with three type *a b c*, of which the lower type, *a*, on those type-bars corresponding to the keys 77, shown in Fig. 1 as provided with the digits and dollar-marks, are the digits and dollar-mark, respectively. The type-bars 79 shown in the drawings are similar in many respects to the type-bars shown in my patents dated July 20, 1886, and July 12, 1887, and respectively numbered 345,836 and 366,577, the joint in the bar 79 being at the point 82. In normal positions the bars 79 rest against combs 83, extending transversely between the protecting-bars 84, and the said bars 84 are extended around the heads of the type, as at 85. 86 marks guide-bars attached to the bars 84 and extending parallel with each other at 87 to form a guide for the type-bars as the type approach the printing-point.

88 is an inking-roller which is or may be



similar in construction and operation to those shown in my patents aforesaid.

89 represents brace-rods connecting the guides 87 with the framework of the machine.

5 90 is a platen for the paper 91, the said platen being mounted in a platen-carrier 92, comprising ends 93, tie-rods 94, and standards 95, united by a cross-bar provided with an antifriction-roller 96. The platen-carrier 92  
10 is provided with suitable paper holding and feeding devices—as, for example, those shown in Figs. 2 and 14; but inasmuch as the said holding and feeding devices shown in said figures form the subject-matter of claims in one  
15 of my aforesaid applications an extended description of their construction and operation is not required in this place. Suffice it to say that 97 is a paper-feeding roller, and 98 a paper-holding bar, and that 99 is a ratchet-wheel  
20 upon the platen 90, which is operated by means of a pawl 100, pivoted at 101 to a lever 102, pivoted in turn at 103 and provided with a spring 104 for normally urging the pawl 100 into engagement with the ratchet 99, and  
25 105 is a detent engaging with the ratchet 99. The standards 95 aforesaid are guided by arms 106, extending forwardly from the main carriage 107, which is provided with antifriction-rollers 108 for coaction with the guide-  
30 rails 6, hereinbefore described. The carriage 107 is drawn toward the left-hand side of the machine by means of a spring 109, connected at one end to a standard 5 and at the other end to one end of a cord 110, whose other end  
35 is attached to and winds on a drum or barrel of a wheel 111, journaled in a bracket 112, attached to the standard 5 at the left-hand side of the machine, the said wheel 111 being connected with the carriage 107 by means of a  
40 cord 113, attached at one end to the said wheel and the other end to the carriage. The spring 109 passes through a perforation in a strut 114 between the guide-rods 6. The motion of the carriage 107 toward the left hand is  
45 controlled by means of an escapement comprising a fixed dog 115 and a movable dog 116, the latter being carried by a plate 117, adapted to have a limited motion upon screws 118 and the said dogs being mounted upon  
50 the carriage 107. A spring 119, attached at its ends to plate 117 and to the carriage 107, serves to draw the plate 117 toward the left-hand side of the machine whenever the dog 116 is disengaged from the rack 120. The  
55 rack 120 is mounted upon or carried by arms 121, journaled at 122 in standards rising from the top plate 3. The arms 121 are united at their forward ends by a universal bar 123, which overlies the key-levers 74 aforesaid.  
60 A spring 124 normally presses the rack-bar 120 upwardly, and the contact of bar 123 with the levers 74 limits such upward motion.

Mechanism for moving the pinion 39 aforesaid step by step into mesh with and from one  
65 to another of the gears 27 will now be de-

scribed. The mechanism includes the bracket 45 and carriage-rack 46 aforesaid. A pinion 125, fast on a shaft 126, journaled in arms 127 rising from the frame 2, is constantly in mesh with the rack 46, lying above the same, as  
70 shown in Fig. 2. At its rear end the shaft 126 is provided with a pinion 128, which is in the path of a short rack 129, attached to or formed with a bar 130, connected with the  
75 carriage 107 by means of downwardly-extending arms 131, which pass through a slot in the frame 3. In the combined type-writing and adding machines described and claimed in my application of November 26, 1898, aforesaid and in the machine illustrated in the drawings  
80 the bar herein marked 130 has attached to its rear face a lock-bar (here numbered 132) which terminates at 133 adjacent the end of rack 129, as shown in Fig. 4, and the shaft 126 is provided with an eccentric lug (here marked 134)  
85 which coacts with the under side of bar 132 to prevent rotation of the shaft 126 except at such time as the rack 129 is in engagement with the pinion 128.

From the described construction it will be  
90 seen that whenever the rack 129 meshes with pinion 128 during the motion of the rack and carriage 107 to and fro the rack 46 and driver pinion or gear 39 are moved in directions the  
95 reverse of the directions of the motion of the carriage 107, inasmuch as the rack 129 engages the top of the pinion 128 and the rack 46 engages underneath the pinion 125—that is to say, the driver 39 moves from left to right as  
100 the paper-carriage 107 moves from right to left, and vice versa. The purpose of this arrangement of parts, which is the preferred arrangement merely, is to add from left to right and to have the numbers shown in slot  
105 38 arranged in their natural order—that is, to have the higher denominations at the left—so that the numbers will be read from left to right. Obviously the printing takes place from left to right, during which time the paper-carriage moves from right to left.  
110

It will be observed also that the pinion 125 is larger in diameter than the pinion 128, whence it results that the rack 46 and the pinion 39 carried thereby move at a higher rate  
115 of speed than does the paper-carriage, or, to state it differently, the motion of the paper-carriage as communicated to the driver 39 is multiplied or increased. I prefer to multiply the motion or increase the speed between the  
120 paper-carriage and that element of the adding mechanism which has a motion of translation, (the axial motion of the gear 39, shown in the drawings and herein described,) for the reason that I prefer to arrange the numbers or digits  
125 upon the peripheries of independently-rotatable wheels or number-carriers and to arrange these wheels side by side in line and to provide each with independent means, as a gear, whereby it may be rotated (except in  
130 the operation of carrying) independently of



all the other wheels or carriers. In order that the numbers may be read off at a glance, it is necessary to make the number-wheels of a width or thickness (exclusive of their attached gears) greater than the uniform letter-space feed commonly employed in type-writing machines. The distances from center to center of the number-wheels or of their independent operating-gears is therefore greater than the uniform letter-space feed of the paper-carriage shown in the drawings, and the driver is moved axially step by step a distance equal to the uniform distance from center to center of the gears 28. It is pointed out that in this instance the number-wheels 10 are separated from the number-wheels 11 by a space to provide for the decimal-point and that this fact does not form an exception to or invalidate the statements just made, inasmuch as the driver moves from the units-wheel to the tenths-wheel in two equal steps instead of one and without being rotated while so doing. It will be observed that as between the driver 39 and the adding-wheels operated thereby one of these elements is stationary upon the framework of the machine, while the other element is movable on said frame relatively to the first-named element. In the instance shown the driver is the element which has such relative motion or motion of translation.

The operation of the foregoing adding devices is as follows: At a predetermined point in the forward traverse of the carriage 107 the bar 132 passes beyond the lug 134, and so releases the shaft 126. The rack 129 engages with the pinion 128 and turns the shaft 126 and moves the rack 46 from the position shown in Fig. 3 and brings the pinion 39 into mesh with the first gear 27, counting from the left in Fig. 3. On the downward stroke of any key the corresponding type-block is thrown against the platen and a character imprinted upon the paper thereon, the universal bar is lifted, and the rack-bar is rocked from the movable to the fixed dog on the carriage. On the release of the key the type-bar and key-lever are returned to normal positions, and so also of the rack-bar. The carriage now moves forward one letter-space, and the rack 129 rotates the pinion 128, shaft 126, and pinion 125 correspondingly, and the rack 46, bracket 45, and gear 39 are moved to cause the disengagement of the gear 39 from the first and its engagement with the second pinion 27, counting from the left-hand side of Fig. 3. Now upon the depression of any key on the keyboard and its subsequent release the pinion 39 will through the described mechanism be moved from the second to the third of the gears 27 in Fig. 3, counting from the left-hand side, and so on upon the depression of any of the keys of the keyboard thereafter; but in none of these operations of keys will the pinion 39 be rotated by the shaft 40, thus

rotating the corresponding gear 27 and number-wheel, unless the key operated carries one of the digits "1" to "9," inclusive. It will thus be seen that the pinion 39 may be moved from the position shown in Fig. 3 to the limit of its right-hand movement, as by striking the zero-key and back again, without rotating any of the gears 27 and the number-wheels. If, however, during the traverse of the pinion 39 from left to right and while it is in engagement with any one of the gears 27 one should depress any one of the keys carrying the digits "1" to "9," inclusive, the corresponding lever 70 is operated and the cam 71 of that lever 70 engages with the step or offset 56 opposite it and pushes the frame 51 forward until the step reaches the straight portion or dwell at the forward side of the cam, after which the further motion of the lever 70 does not cause motion of the plate 51 toward the front of the machine. During this forward motion of the plate 51 the wheels 48 are rotated by means of the racks or ratchets 53, and so the shaft 40 and pinions 39 are rotated. The amount of the forward motion of plate 51 and the rotation of shaft 40 and pinion 39 depends upon the particular key depressed, inasmuch as the cams 71 each give a throw to the plate 51 different from the throw given to said plate by each and all of the other of said cams 71. This difference of throw is secured by arranging the cams 71 in a straight line at right angles to the direction of motion of the plate 51 and by arranging the faces or steps 56 obliquely to the line of motion of the plate in such wise that the cam 71 corresponding to the key carrying the numeral "1" moves the plate 51 to a given or unit distance and the cam 71 corresponding to the numeral 2 moves the said plate 51 twice as far or two units distance. In like manner the "3" key causes the plate 51 to be moved a distance of three units or three times as far as by the "1" key, and so on for the remainder of the keys carrying numerals to and including "9." The stop-faces 57 coact with the rear edges of the cam-plates 71 to prevent overthrow of the plate 51 during the operation of the machine. The described variable throws of the plate 51 are transmitted through the described gearing to that particular gear 27 with which the pinion 39 may be in mesh, and from said gear 27 the motion is transmitted through a pinion 30 to a pinion 28, and so to the corresponding number-wheel. Assuming that the wheels are all set at "0" and that we wish to write 1499915.96, the pinion 39 is brought into mesh with the extreme left-hand pinion 27, since the first digit is to be shown upon the extreme left-hand number-wheel, and the keys carrying the digits are then operated. On the depression of the "1" key its corresponding cam 71 moves the plate 51 forward one space or unit and rotates the shaft 40, pinion 39, left-hand pinions 27, 30, and 28 and brings the



digit "1" in view at the extreme left of said slot 38 in Fig. 12. On the release of the "1" key the paper-carriage 107 moves forward one letter-space, the rack 129 rotates the pinion 128, and the motion thereof is transmitted to the pinion 39 in a manner before described, causing it to move from the first gear 27 at the left in Fig. 3 to the second gear 27 and to mesh therewith and the springs 67 return the plate 51 to normal position and the ratchet-teeth 53 thereof ride or slip over the ratchet-teeth 48, the plate 51 lifting at such time. Possible reverse rotation of the shaft 40 at such times may be prevented by suitable means, as by the roller-detent 49, hereinbefore described. Also any possible overthrow by the plate 51 is prevented by the locking of the plate by means of the parallel front and rear edges of the cam-piece 71, locking between the forward step 56 and the rear step 57 opposite. The "4" key is next depressed, and its cam 71 causes the plate 51 to move forward four times as far as before, thus imparting four times as great a motion to the parts operated by the plate 51 as in the previous case and brings the numeral "4" up alongside the numeral "1" at the slot 38. In similar manner the remainder of the digits before or to the left of the decimal-point are written upon the paper 91 and are also brought to the slot 38, it being observed that there shall be no punctuation-marks written at all. When the number in the units place has been written, the pinion 39 does not in the instance shown move from the gear 27 corresponding thereto into mesh with another gear 27, but moves into a space between the gear 27 corresponding to units and the gear 27 corresponding to tenths, or the digit first to the right of the decimal-point. For this reason the number-wheels corresponding to tenths and to units and their corresponding operating-pinions are twice as far apart as are the number-wheels and the operating-pinions at the left of such decimal-point, as shown in Fig. 3. Either the space-key 135, carried by levers 136 and extending under the universal bar 123, or a key carrying the period or decimal-point may be struck at this time, whereupon the pinion 39 will be moved forward into mesh with gear 27 corresponding to the tenths position and the remaining digits may be imprinted and also shown in the slot 38. The paper-carriage is now returned to the right, and the pinion 39 through the described connections is moved toward the left of the machine. As the rack 129 moves out of mesh with the pinion 128 the locking-bar 132 comes over the flat portion of the stop 134, and so prevents any further motion of the pinion 128 and the parts operated thereby, and the pinion 39 comes to rest in the position shown in Fig. 3.

It will be observed from the foregoing operation that four of the number-wheels in the

actual machine would have their "9's" showing opposite the slot 38—to wit, the "9" in the tens of thousands, the thousands, the hundreds, and the tenths. With these number-wheels in these positions one of the pinions 32 on each of the corresponding gears 27 is in mesh with the corresponding pinion 31, ready to "carry" it to the next higher denomination upon the further turning forward (adding) of either of these four number-wheels. Let us assume that the number next to be written is one thousand. The paper-carriage is moved forward or toward the left until it is in position for writing the numeral "1" in its proper position under the "9" in the thousands place. In so moving the carriage forward the shaft 126 is unlocked and is rotated by the rack 129, thus moving forward the pinion 39 until it is in engagement with the gear 27 corresponding to the thousands number-wheel. With the parts in this position and upon operating the "1" key the following operations occur: The plate 51 is moved forward one unit or space, and this motion is transmitted to the thousands-wheel, turning it so that it shows the zero in the slot 38. At the same time the pinion 32 on the thousands-gear 27, which is in mesh with the pinion 31, rotates the said pinion 31, and this pinion 31 rotates the tens-of-thousands number-wheel to bring the naught into view in the slot 38, and the pinion 28 on the tens-of-thousands number-wheel rotates its driving-pinion 30, and said driving-pinion 30 rotates the tens-of-thousands gear 27 forwardly one space, and the carrying-pinion 32 on said tens-of-thousands gear 27 rotates the carrying-pinion 31, with which it is in mesh, and the last-named pinion 31 rotates the hundreds-of-thousands wheel 10, through the gear 29, to bring the numeral "5" into position opposite the slot 38; but the forward turning or adding motion of the thousands number-wheel 10 does not cause the hundreds-wheel 10 to turn forward from the position in which it shows the digit "9" in the slot 38 to the position in which it would show the naught or other figure in said slot, although the pinion 29 on the thousands number-wheel 10 rotates its corresponding pinion 31 in the direction in which the latter is moved when carrying; yet nevertheless there is no motion of the hundreds-wheel 10, because the pinion 32, which is in mesh at this time with the last-named pinion 31, rotates freely in the direction in which it must slip past its spring 34, (the spring 36, engaging with the hundreds-wheel 10, being stronger than the spring 34 the latter yields.) At the completion of the described operation the number-wheels show "1500915.96" at the slot 38.

For the purpose of returning the number-wheels to an initial or zero position or that in which the naughts of all the wheels are opposite the slot 38 I provide a roller 137, the



shaft of which is journaled in arms 138, fixed upon the shaft 26 aforesaid. One of the arms 138 is provided with an extension 139 downward and forward to the front edge of the machine, and the frame or plate 2 is cut away at 140 to permit the finger to reach the finger-piece 141 on the said arm 139. The shaft 142 of the roller 137 is extended beyond the supports 138 to the right-hand side of the machine, where it is provided with a knurled knob 143, whereby it and the roller 137 may be turned. In order to stop the number-wheels in their initial position when they are returning thereto, the tie-rod 25 has pivoted thereto a plate 144, and this plate is provided with a series of extensions, fingers, or stops 145, there being one such stop for each of the pinions 27. The pinions 27 are each provided with two pins 146 and 147 at opposite sides of the center thereof and in position to coact with the ends of the stops 145. The plate 144 hangs loosely from the shaft or rod 25 in such wise that the ends of the stops 145 are normally in position to coact with the stop-pins 146 147 as the gears 27 are rotated in the direction of the arrow at Fig. 13. The roller 137 normally bears upon the number-wheels with so light a pressure that it does not interfere with the proper rotation thereof. When it is desired to return the number-wheels to their initial positions, a finger is placed upon the finger-piece 141 and the arm 139 is pushed rearwardly, thus pushing the roller 137 against the peripheries of the number-wheels, and at the same time the knob or handle 143 is rotated to cause the roller to rotate in the direction of the arrow at Fig. 13. The number-wheels are thus rotated by friction against the resistance of the detent-springs 35 36, and the number-wheels of course rotate their driving gears or pinions 28, 30, and 27. The wheels 27 are rotated in the direction of the arrow thereon at Fig. 13, and the wheels 32 thereon pass the pinions 31. The rotation of the shaft 142 is continued until all the wheels show the naught on the slot 38, each wheel being stopped when a naught thereon comes opposite the said slot 38 by the contact of pins 146 or 147 on its driving-pinion 127 with the end of the corresponding stop 145. It being assumed that the units-wheel 10 has moved to a position where its naught registers with the slot 38, but that the tenths-wheel 11 has not, the said wheel 10, its gear 29, and pinion 31 are locked through the abutment of the pin 146 or 147 with the stop 145. A continued rotation of the roller 137 rotates the tenths-wheel 11, its pinion 30, and gear 27, and as the star-wheel 32 thereon is brought into contact with the temporarily-fixed pinion 31 it is forced to rotate on its pivot 33, as illustrated at Fig. 13, showing a tooth flexing the spring 34, which is about to snap off and act as a detent when the gear 27 is rotated reversely by the driving-gear 39. The lever 139

and knob 143 are now released, and the machine is ready for reuse. Care must be observed, however, in returning the number-wheels to zero to have the gear 39 out of mesh with the gears 27. This may be secured by returning the paper-carriage so far to the right as will move the said pinion 39 to the positions shown at Fig. 3, or the same result may be secured by moving the plate 15 over against stop 20, thus moving the wheels 10 11 and their gears.

It sometimes occurs in type-writing that the impression made is indistinct and it is necessary to again strike the key whose corresponding type made an indistinct impression in order to obtain an impression of sufficient distinctness, or it may happen that a wrong key has been struck and it is necessary to erase the imprint that has been erroneously made and to strike the proper key. In the first case the type-writer carriage is moved backward one step or until the scales and pointers show that the faintly-impressed letter or character is at the printing-point, and then the proper key is struck. In the second case the erroneous impression may be first erased and then the carriage be so moved as to bring that portion of the paper to the printing-point, and the proper key is then struck.

In the use of the combined type-writing and adding mechanism other steps in addition to the erasure and proper positioning of the carriage (or the latter alone) are required before the proper key is to be struck if the machine is in position to be adding and a digit-bearing key has been struck erroneously. In the last-named case the striking of a digit-bearing key erroneously will operate the corresponding number-wheel and turn it a distance corresponding to the digit struck erroneously and will also imprint the digit upon the paper on the platen. If a digit is but faintly impressed upon the paper and it is desired to deepen the impression or if the wrong key has been struck, the corrections required are those already pointed out and also a correction in the adding mechanism. It ordinarily happens that the type-writer operator is aware of having struck a wrong key as soon as a wrong stroke is made, and the errors are commonly noted for correction; but in the ordinary type-writer it is preferable to make the corrections at once, and this may be done as follows: The numbers shown in the slot 38 maybe "999," and the pinion 39 may be in engagement with the pinion 27, which operates the units-wheel 10, and one may strike the "7" key when intending to strike the "6" key. This would cause the numbers shown in the slot 38 to be "1006," whereas the number desired is "1005," and the impression upon the paper on the platen would be a "7" underneath the "9" in the units place. In order to make the necessary correction, the "7"



upon the paper is erased, also the operator by means of the finger-piece 17 and arm 16 moves the adding-mechanism carriage 15 from the position shown in Fig. 3 over against the stop 20, thus bringing the gears 27 into positions in which they are out of mesh with the driver 39 in all step-by-step positions thereof. The operator now turns the thousands, hundreds, tens, and units wheels backward by hand or by a pointed instrument inserted between the teeth of the gears of these wheels to bring the naught of the thousands-wheel and the "9's" of the other of said wheels opposite the slot 38. Also the paper-carriage is moved backward step by step until the "9" of the number "999" in the units place is in such position that the impression made upon the striking of any key will be immediately beneath it. The operator now moves the adding-mechanism carriage by means of the handle 17 to bring it over against the stop 19 or in the position shown in Fig. 3. This will bring the driver 39 into mesh with the gear 27, which operates the units-wheel of the adding mechanism. The operator now strikes the proper key, (the "6" key,) thus imprinting the "6" underneath the "9" in the units place and also rotating the units-wheel from the position in which it shows the "9" in the slot 38 to the position in which it shows the "5" in said slot. Incidentally the carrying mechanism rotates the tens, the hundreds, and the thousands number-wheels to cause the first two to show their naughts in said slot and the last to show the figure "1" in said slot, or the adding mechanism will then show "1005" in the slot 38.

When the carriage 15 is moved against the stop 20, the gears 27 are thrown out of proper relationship to pinion 39, so that as the pinion 39 moves step by step to the right it always takes position intermediate the gears 27, and so fails to turn any of them should it be operated by the striking of the digit-bearing keys on the keyboard of the machine. It is remarked that whenever it is desired to strike a digit-bearing key a second time in order to make a previously-made imprint of a digit more clear or visible the carriage 15 is moved against the stop 20, and then the carriage of the recording mechanism is moved to bring the faint impression to the printing-point, and then the proper key is struck with sufficient force to clearly imprint the digit or character. Afterward the adding-mechanism carriage 15 is moved over against the stop 19, and the work may proceed. The foregoing remarks apply to the case of a faint impression of any of the digits from "1" to "9," inclusive. In the case of a faint or an erroneous impression of the naught it is only necessary to bring the carriage of the recording mechanism into position to have the faint impression at the printing-point and to again strike the naught-bearing or other key, as the case may require.

In recording the sum of a column of numbers, which sum is shown in the slot 38, the carriage 15 is first moved over against stop 20, the carriage 107 is then positioned to write the sum in proper relation to the decimal-point, the sum is read from the number shown in the slot 38, and the proper keys are operated to record the sum on the paper on the platen.

Whenever it is desired to release the carriage-escapement to permit the carriage 107 and the driver 39 to be moved forward, it may be done by depressing a key 148 on a lever 149, which lever underlies the universal bar 123 and rocks the rack 120 so far as to disengage it from both the dogs 115 and 116. The carriage is now free to run forward until arrested by hand in proper position.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a series of independently-rotatable number-wheels, independent gears operatively connected each with a corresponding number-wheel for rotating the same, carrying mechanism, a driver-gear adapted to mesh with said independent gears for operating them one at a time and said driver and said independent gears with their number-wheels and the carrying mechanisms being movable one relatively to the other in a step-by-step manner, a reciprocating plate or frame for actuating said driver-gear, cams for coaction with said plate to move it different distances from an initial position, and gearing intermediate said plate and said driver for rotating the latter, to turn the number-wheel operatively connected with said driver, when said plate or frame is actuated substantially as described.

2. The combination of a series of independently-rotatable number-wheels, independent gears operatively connected each with a corresponding number-wheel for rotating the same, carrying mechanism, a driver-gear adapted to operate said independent gears one at a time and said driver and said gears with their number-wheels and the carrying mechanisms being movable one relatively to another in a step-by-step manner to cause engagement between said driver and said independent gears in succession, a reciprocating number-wheel-actuating plate or frame provided with a series of steps, cams for coaction with said steps to move the plate different distances from its initial position, and gearing intermediate said plate or frame and said driver for rotating the latter variable distances by the movement of said actuating plate or frame, substantially as described.

3. The combination of a series of independently-rotatable number-wheels, independent gears operatively connected each with a corresponding number-wheel, carrying mechanism, a variable-throw rotatory driver-gear movable from one to another of said independent



gears and operating the same and their corresponding number-wheels independently of the other gears and their wheels, a reciprocatory spring-restored ratchet-bar, a pivoted guide for said bar, a ratchet-wheel connected with the driver-gear, finger-keys, mechanism actuated by said finger-keys for variably moving said bar from said initial position to rotate the driver and thus transmit a rotary movement to the number-wheels, and means controlled by said keys for moving the driver in a step-by-step manner from one to another of said independent gears, substantially as described.

4. The combination of a series of independently-rotatable number-wheels, independent gears operatively connected each with a corresponding number-wheel, a driver for meshing with said gears one at a time and movable from one to another thereof, a reciprocatory spring-controlled ratchet-bar, a pivoted guide for said bar, a ratchet-wheel connected with the driver, cams for actuating said ratchet-bar, keys, connections between said keys and said cams, and other connections between said keys and said driver for moving the same step by step from one to another of said gears, substantially as described.

5. The combination of independently-rotatable number-wheels, independent gears operatively connected each with a corresponding number-wheel, a driver-gear for operating said independent gears one at a time and movable from one to another thereof, a reciprocatory spring-pressed frame or plate, key-actuated cams for moving such plate different distances from its initial position, gearing connecting said plate or frame and said driver for rotating the driver variable distances by the movement of said frame or plate, and mechanism also operated by said keys for moving the said driver step by step from one to another of said gears, substantially as described.

6. The combination of a series of independently-rotatable number-wheels, independent gears operatively connected each with the corresponding number-wheel, a driver for meshing with said gears one at a time, and movable from one to another thereof, ten digit and naught type operating keys, a carriage, a reciprocatory spring-pressed ratchet-bar, a pivoted guide for said bar, a ratchet-wheel connected with the driver, mechanism for connecting said keys with said ratchet-bar for moving it variable distances, and mechanism for moving the carriage and the driver step by step, substantially as described.

7. The combination of a series of independently-rotatable number-wheels, independent gears operatively connected each with a corresponding number-wheel, a driver adapted to engage with said gears one at a time and movable from one to another thereof in a step-by-step manner, ten digit and naught

type operating keys, a carriage having a uniform step-by-step feed less than the distances from center to center of said adding-wheels, mechanism connecting said keys with said driver for rotating the driver variable distances, and speed-multiplying mechanism intermediate said carriage and said driver for moving the driver step by step from one to another of said gears, substantially as described.

8. The combination of independently-rotatable number-wheels of different denominations mounted side by side on the same shaft, operating-gears 28 and carrying-gears 29 on the number-wheels, each carrying-wheel being operatively connected to the operating-gear on the number-wheel of the next higher denomination, independently-journalled driving-gears 27, each of which is operatively connected to a corresponding operating-gear 28, and carrying devices 32 mounted eccentrically of and on the driving-gears 27 and yielding freely in but one direction and operatively and intermittently connected with the carrying-gears 29.

9. The combination of two independent rotatable side by side number-wheels provided each with a driven gear and the wheel of higher denomination with a carrying-gear, independent gears operatively connected each with the driver-gear on the corresponding number-wheel, an independently-rotatable pinion mounted eccentrically of and on the independent gear for the number-wheel of lower denomination and operatively connected from time to time with the carrying-gear of the wheel of higher denomination to actuate the same in carrying, and a detent for preventing the said pinion from turning freely in but one direction, substantially as described.

10. The combination of two independent rotatable number-carrying wheels placed side by side and provided each with a driven gear and the wheel of higher denomination provided with a carrying-gear, independent gears operatively connected each with the driven gear of the corresponding number-wheel, a carrying-pinion pivoted upon and eccentrically of the operating-gear of the wheel of lower denomination and operatively but intermittently connected with and actuating the carrying-gear on the wheel of higher denomination, and a flat spring for engaging the teeth of said carrying-pinion flatwise and endwise of the spring and permitting a free rotation of the pinion in one direction and a limited rotation thereof in the opposite direction, substantially as described.

11. The combination of two or more number-wheels provided with driven gears, independent gears operatively connected each with said gear of the corresponding number-wheel and each provided with a stop pin or lug, pivoted detents or fingers adapted to coact with said pins or lugs to stop the gears when the gears and wheels are moved in one



direction and movable out of the path of said pins or lugs when the gears or wheels are moved in the opposite direction, and a friction device for rotating said number-wheels and gears to bring them to their initial or zero positions with said pins against and arrested by said detents or stops, substantially as described.

12. The combination of independently-rotatable number-wheels arranged side by side upon a shaft or axis and one outside and all the intermediate wheels provided at each side with a gear and the other outside wheel provided with but one gear, independent pinions arranged on a single shaft and loose thereon and meshing with said gears, independent driver-gears meshing with alternate pinions and provided each with a detent device yielding in but one direction to pass the remaining alternate pinions when the gears are moved in one direction and intermittently actuating the said remaining alternate pinions for carrying when the gears are moved in the opposite direction, stop lugs or pins on said driving-gears, movable detents or fingers adapted to arrest said lugs and gears and parts operated thereby as the gears are moved in one direction and permitting the lugs or pins to pass freely as the gears move in the reverse direction, and frictional means for rotating said number-wheels and operating-gears backward to bring the lugs against said detents and arresting the wheels in their initial or zero positions, substantially as described.

13. The combination of independently-rotatable number-wheels arranged side by side on a common axis, a roller journaled in pivoted arms and adapted to coact with said wheels to rotate them by frictional contact, and means for arresting each of said wheels in its initial or zero position, substantially as described.

14. The combination of a carriage, an adding mechanism, a driver therefor movable in the direction of its axis from one to another of the elements of the adding mechanism, a rack, a pinion, and connections between said pinion and said driver for moving the latter in the direction of its axis or shaft, and said rack and pinion being out of mesh with each other during a part of the traverse of said carriage and meshing with each other at a predetermined point, and key-operated mechanism for operating said driver, substantially as described.

15. The combination of side by side independently-rotatable number-wheels, a gear 28 on the wheel of lower denomination, a gear 29 on the wheel of higher denomination, a pinion 30 meshing with gear 28, a pinion 31 meshing with gear 29, a driving-gear 27 meshing with pinion 30, and a one-way yielding device on gear 27 adapted to intermittently actuate pinion 31 to carry, substantially as described.

16. The combination of two number-wheels independently rotatable on the same shaft or

axis, a gear 28 on the wheel of lower denomination, a gear 29 on the wheel of higher denomination, a pinion 30 meshing with gear 28, a pinion 31 meshing with gear 29, a driver-gear 27 meshing with pinion 30, a pinion 32 pivoted on gear 27 eccentrically thereof and adapted to engage with pinion 31 to carry, and a detent permitting said pinion 32 to rotate freely but in one direction, substantially as described.

17. The combination of a series of number-wheels provided with gears, a series of independent driving or motion-transmitting gears operatively connected therewith and provided with stop pins or lugs, a pivoted plate or bar provided with a series of fingers having flat ends adapted to coact with said stop pins or lugs, and a frictional device for rotating the number-carrying wheels and gears to bring them to their initial or zero position, substantially as described.

18. The combination of a series of number-wheels, a common driver constructed to coact with said number-wheels one at a time, a series of keys, a series of cams operated by said keys, and mechanism for enabling any of said cams to operate said driver, each of said cams being provided with stop portions for preventing overthrow of said driver.

19. The combination of a series of number-wheels, a common rotatory driver therefor, and a series of key-operated cams, all of which are normally disconnected from said rotatory driver but any of which may be operated to rotate said driver.

20. The combination of a series of number-wheels, a common rotatory driver therefor, and a series of key-operated cams, all of which are normally disconnected from said rotatory driver but any of which may be operated to rotate said driver, and each of said cams being provided with a stop portion for preventing overthrow of said driver.

21. The combination of a series of number-wheels, a common rotatory driver therefor, a ratchet-wheel for rotating said driver, a straight rack engaging said ratchet-wheel, a series of working faces carried by said rack, a series of independently-operable cams for engaging said working faces to move said rack variable distances, and a spring for returning said rack to normal position.

22. The combination of a series of number-wheels, a common rotatory driver therefor, a ratchet-wheel for rotating said driver, a rack engaging said ratchet-wheel, a series of working faces carried by said rack, a pivoted frame upon which said rack is constructed to slide endwise, a series of cams for variably sliding said rack upon said frame, and a spring for returning said rack to normal position.

23. The combination of a series of number-wheels, a common rotatory driver therefor, a pinion for rotating said driver, a rack engaging said pinion and provided with a series



of working faces, a series of cams constructed to engage said working faces but normally disengaged therefrom, and a series of key-operated levers upon which said cams are fixed.

5 24. The combination of a series of number-wheels, a common rotatory driver therefor, a pinion for operating said driver, a rack engaging said pinion, a stepped frame upon which said rack is fixed, a pair of guides between which said frame is mounted and upon  
10 which it slides, and means for sliding said stepped frame variable distances from normal position.

25. The combination of a series of number-  
15 wheels, a common driver therefor, a frame operatively connected to said driver, two sets of stepped faces formed upon said frame, and a row of independently-operable cams for engaging said stepped faces, the faces in one  
20 set being constructed to be engaged by the cams for moving the frame and rotatory driver, and the faces in the other set being constructed to engage said cams for arresting the frame and the driver.

25 26. The combination of a series of key-levers, links 73 attached thereto, levers 70 connected to said links, a cam mechanism controlled by said levers, a series of number-wheels, and a common driver therefor oper-  
30 ated by said cam mechanism.

27. The combination of a series of number-wheels, a common driver 39 for said wheels, pinion 48 for transmitting rotary motion to said driver, rack 53 for rotating said pinion,  
35 independent cams 71 for operating said rack, levers 70 connected to said cams, links 73 connected to the levers 70, and key-levers 74 connected to said links.

28. The combination of a series of number-  
40 wheels, a common driver 39 for said wheels, pinion 48 for transmitting rotary motion to said driver, rack 53 for rotating said pinion, stepped working faces 56 and 57 connected to said rack, independent cams 71 for engag-  
45 ing said working faces, levers 70 connected to said cams, links 73 connected to the levers 70, and key-levers 74 connected to said links.

29. The combination of a series of number-wheels, a common rotatory driver therefor,  
50 pinion 48, a rack-frame connected thereto, a series of cams 71 normally disengaged from said rack-frame and each mounted on one arm of a lever 70, links 73, attached to the other arms of said levers 70, and levers 74 connected  
55 at their rear ends to said links and bearing finger-keys at their forward ends.

30. The combination of a spring-propelled carriage 46, bracket 45 thereon, spur-gear 39 supported independently of said carriage but  
60 controlled by said bracket, spur-gears 27 constructed to be engaged by said driver one at

a time during the movements of said carriage, number-wheels connected to said gears 27, and a series of keys operatively connected to said spur-gear 39.

31. The combination of independently-rotatable number-wheels arranged side by side on a common axis, a friction device journaled in pivoted arms and adapted to coact with said wheels to rotate them by frictional contact,  
70 and means for arresting each of said wheels in its initial or zero position.

32. The combination of a series of independently-rotatable disks; a rotary shaft for rotating said disks, said shaft having frictional  
75 connection with the several disks independently; and means for arresting said disks.

33. The combination of a series of independently-rotatable number-wheels arranged side by side; a rotary shaft for rotating said  
80 number-wheels, said shaft having frictional connection with the several number-wheels independently; and arresting means for said wheels.

34. The combination of a series of inde-  
85 pendently-rotatable disks arranged side by side; a rotary shaft for rotating said disks, said shaft having frictional connections with the several disks independently; a series of wheels, one for each disk, each wheel and its  
90 disk being geared together; and arresting means coöperating with said wheels.

35. The combination with a series of register-wheels arranged side by side, of actuating means for said wheels; and means for rela-  
95 tively displacing said series of wheels and said actuating means in a direction parallel to the axes of said wheels to position said actuating means between said wheels.

36. The combination of a series of register-  
100 wheels mounted side by side; actuating means for said wheels; and a frame supporting said wheels and mounted to have a movement in a direction parallel to the axes of said wheels and of an extent to position said actuating  
105 means between the wheels.

37. The combination of a series of register-wheels; an actuator therefor; means for moving said series of wheels and said actuator, the one with reference to the other to cause  
110 said actuator to engage any one of said wheels; and means for moving said series of wheels and said actuator, the one with reference to the other, to position said actuator between two adjacent register-wheels.

Signed in the borough of Manhattan, in the city, county, and State of New York, this 30th day of March, 1899.

EUGENE FITCH.

Witnesses:

K. V. DONOVAN,  
E. M. WELLS.