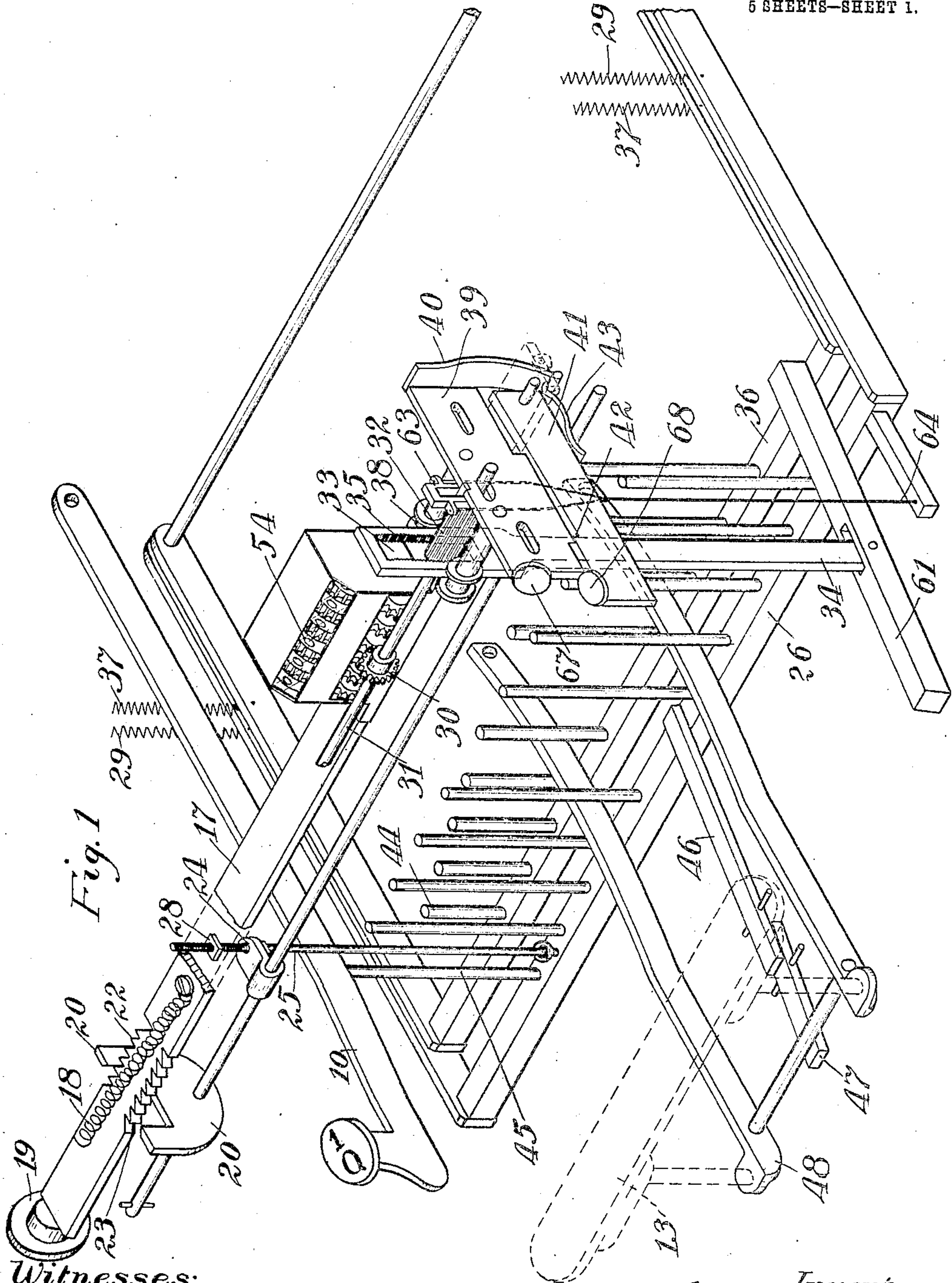


O. H. GILL.
 ADDING ATTACHMENT FOR TYPE WRITERS.
 APPLICATION FILED NOV. 16, 1908.

924,759.

Patented June 15, 1909.

5 SHEETS—SHEET 1.



Witnesses:

Edwin Phelps.

Mary M. Dillman

By

Charles H. Gill

Inventor:

Russell & Russell

Attorneys.

C. H. GILL.
 ADDING ATTACHMENT FOR TYPE WRITERS.
 APPLICATION FILED NOV. 16, 1908.

924,759.

Patented June 15, 1909.

5 SHEETS—SHEET 2.

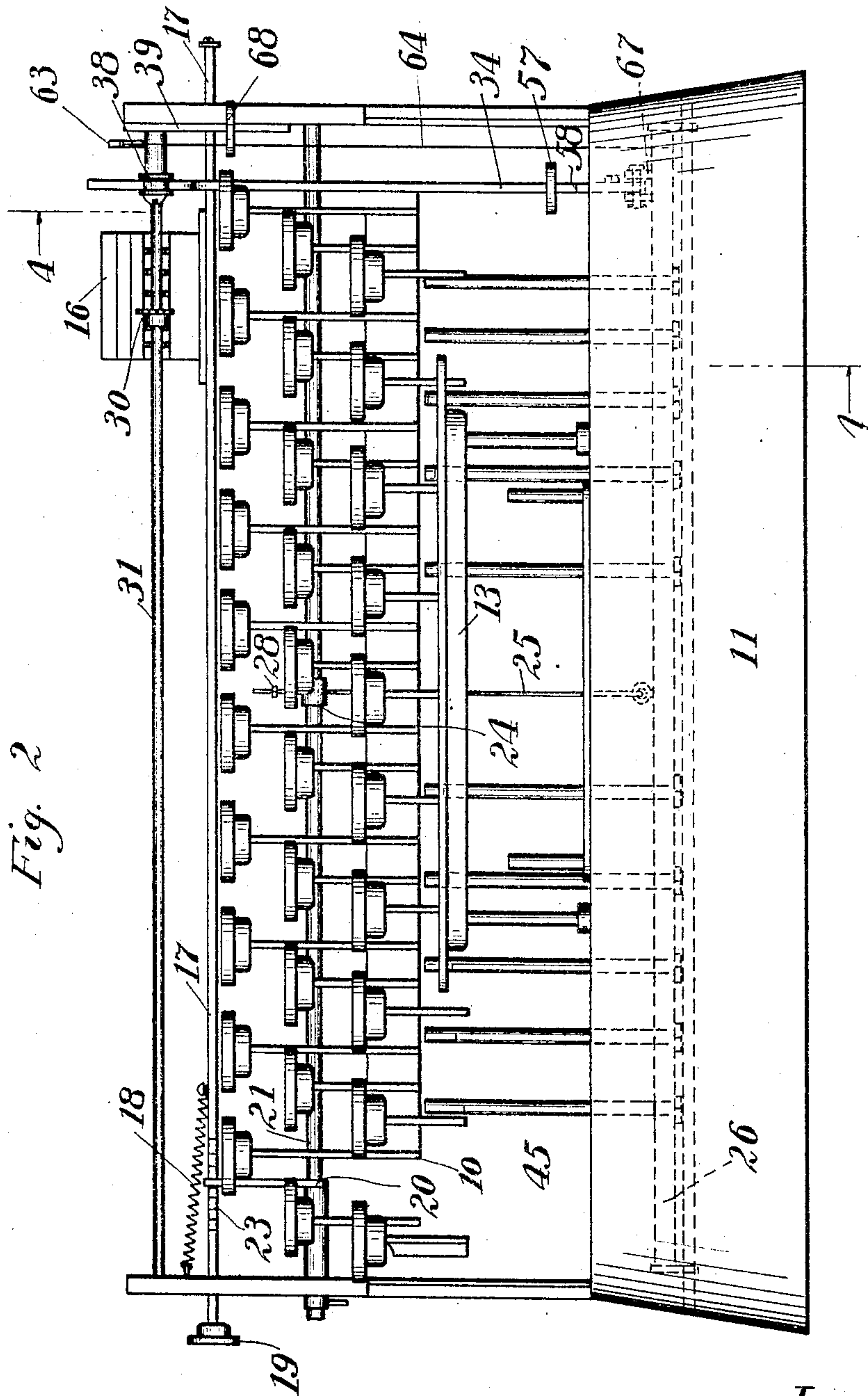


Fig. 2

Witnesses:

Edwin Phelps
Mary M. Sullivan

Inventor:

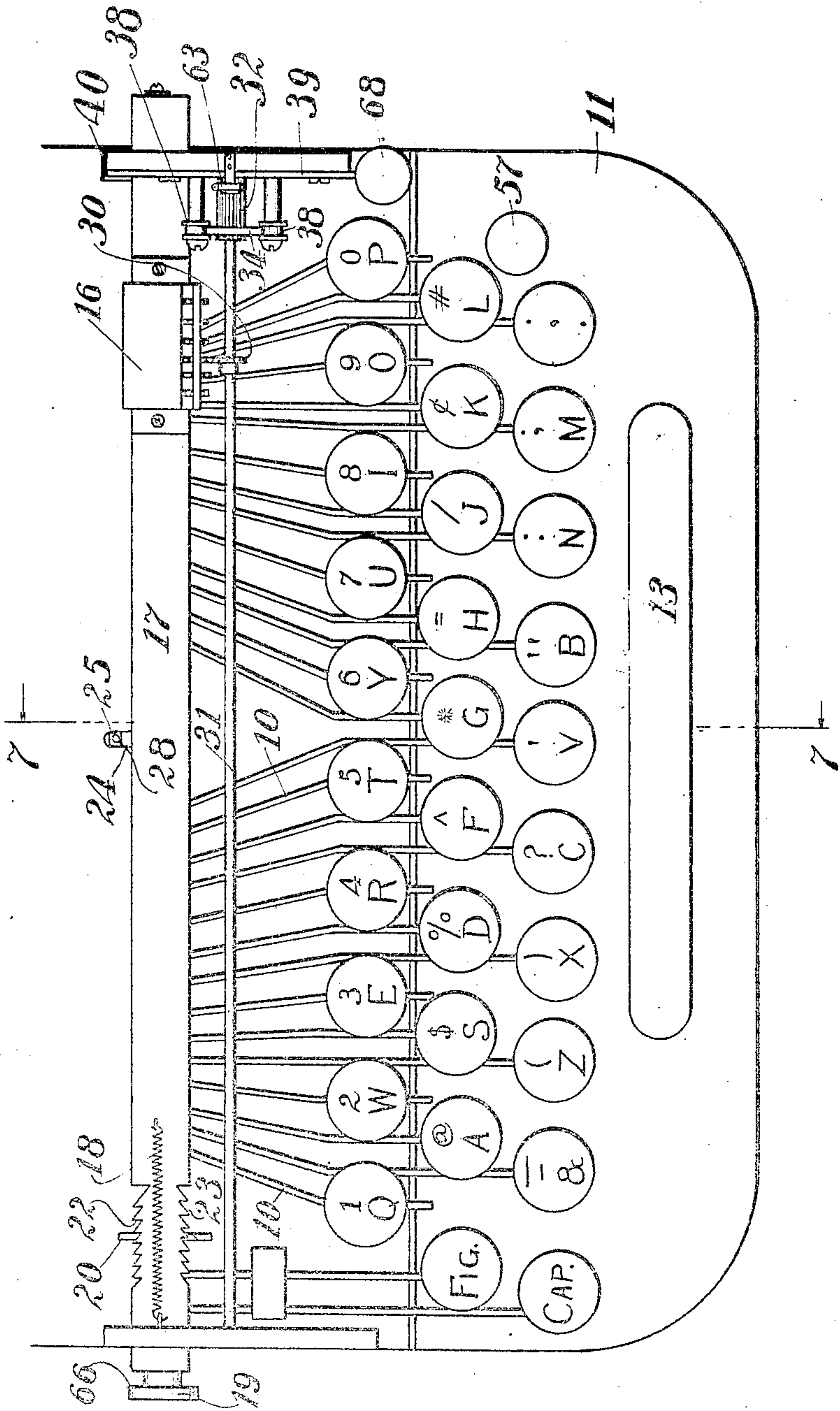
Charles H. Gill,
 By *Rumrider & Rumrider*
 Attorneys.

C. H. GILL.
 ADDING ATTACHMENT FOR TYPE WRITERS.
 APPLICATION FILED NOV. 16, 1908.

924,759.

Patented June 15, 1909.
 6 SHEETS—SHEET 3.

Fig. 3



Witnesses:

Edwin Phelps
 Mary W. Billman

Inventor:

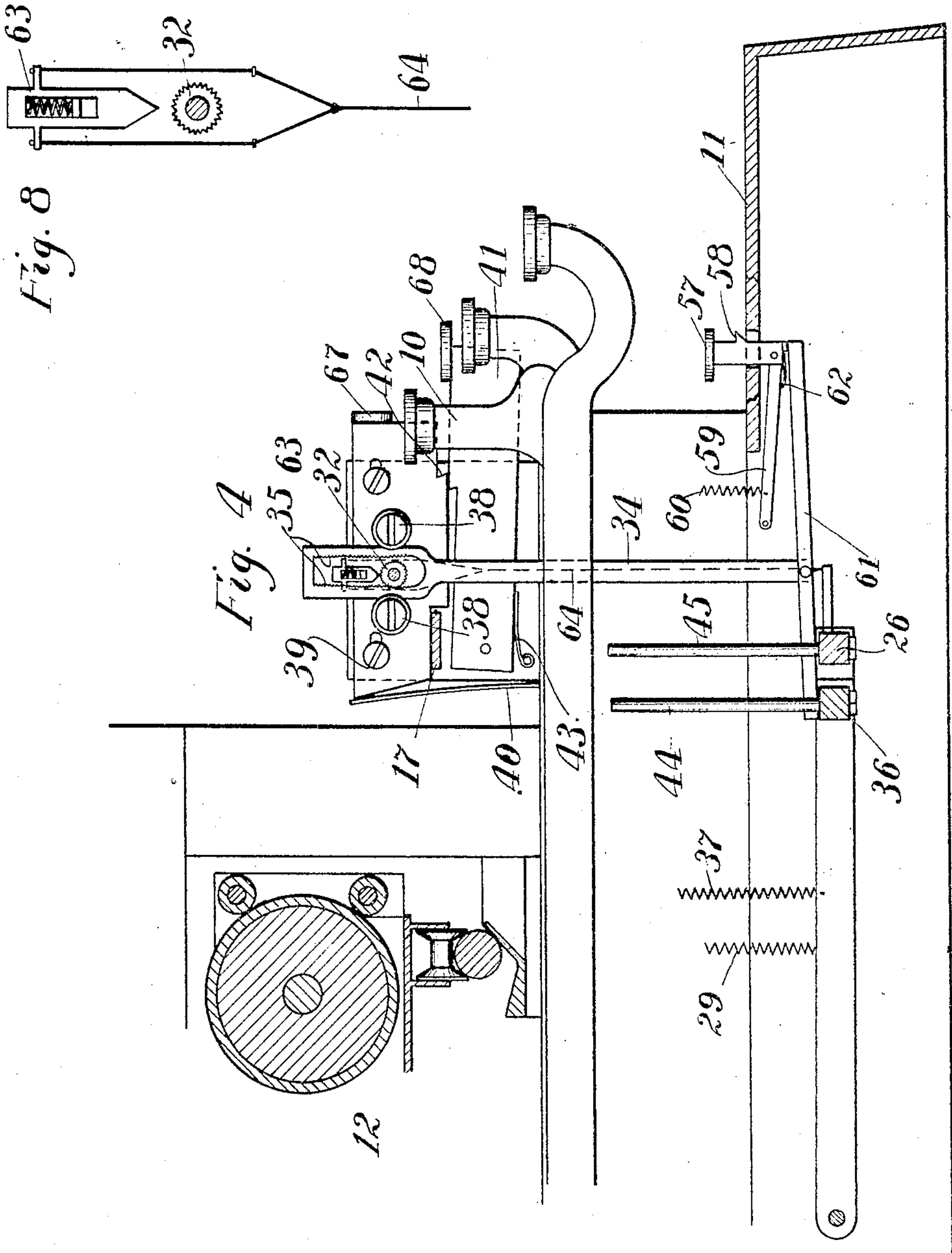
Charles H. Gill,
 By *Rumpler & Rumpler*
 Attorneys.

C. H. GILL.
 ADDING ATTACHMENT FOR TYPE WRITERS.
 APPLICATION FILED NOV. 16, 1908.

924,759.

Patented June 15, 1909.

5 SHEETS—SHEET 4.



Witnesses:

Edwin Phelps
Mary M. Sullivan

Inventor:

Charles H. Gill
 By *Remond & Remond*
 Attorneys.

C. H. GILL.
 ADDING ATTACHMENT FOR TYPE WRITERS.
 APPLICATION FILED NOV. 16, 1908.

924,759.

Patented June 15, 1909.

6 SHEETS—SHEET 5.

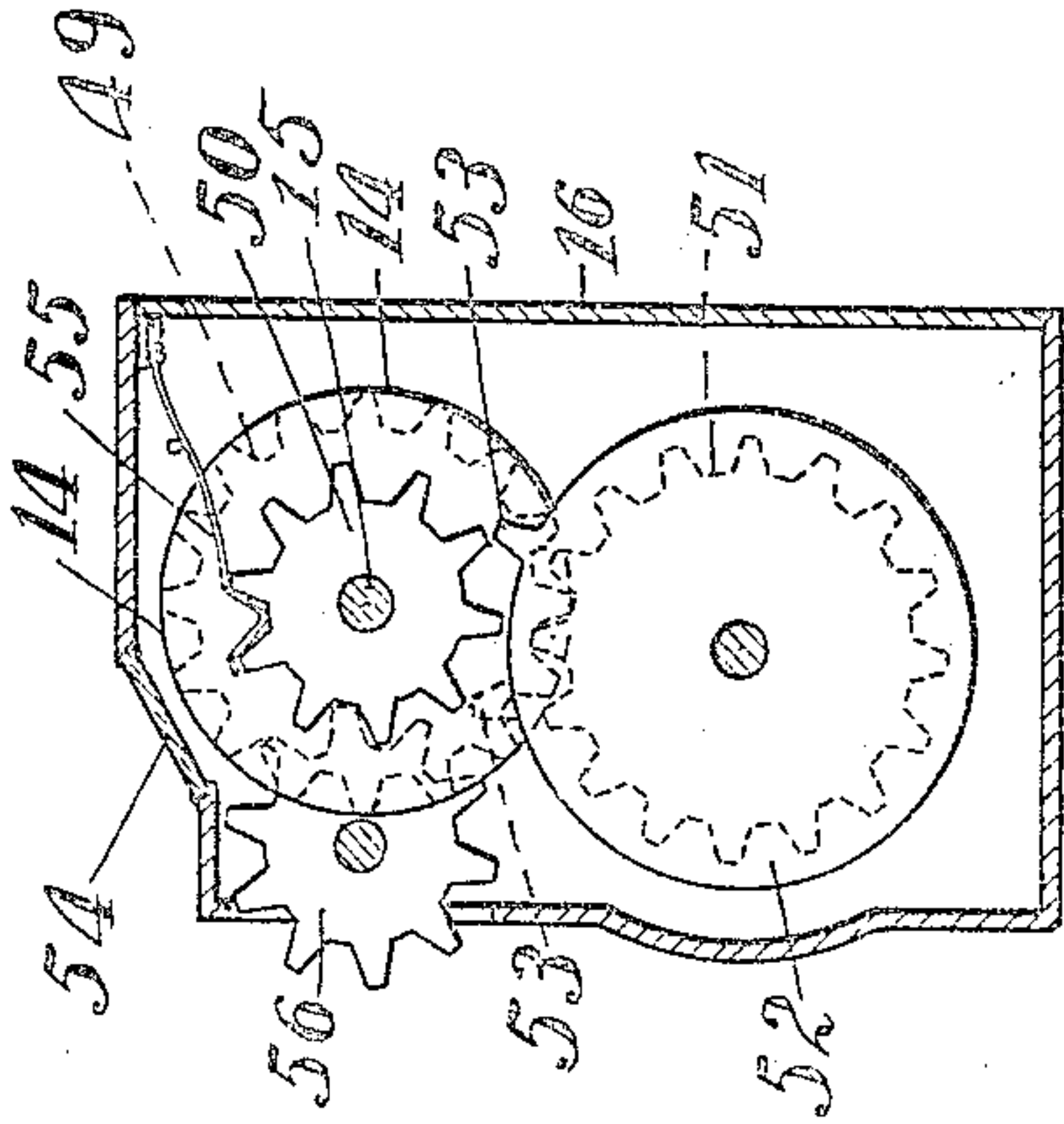


Fig. 6

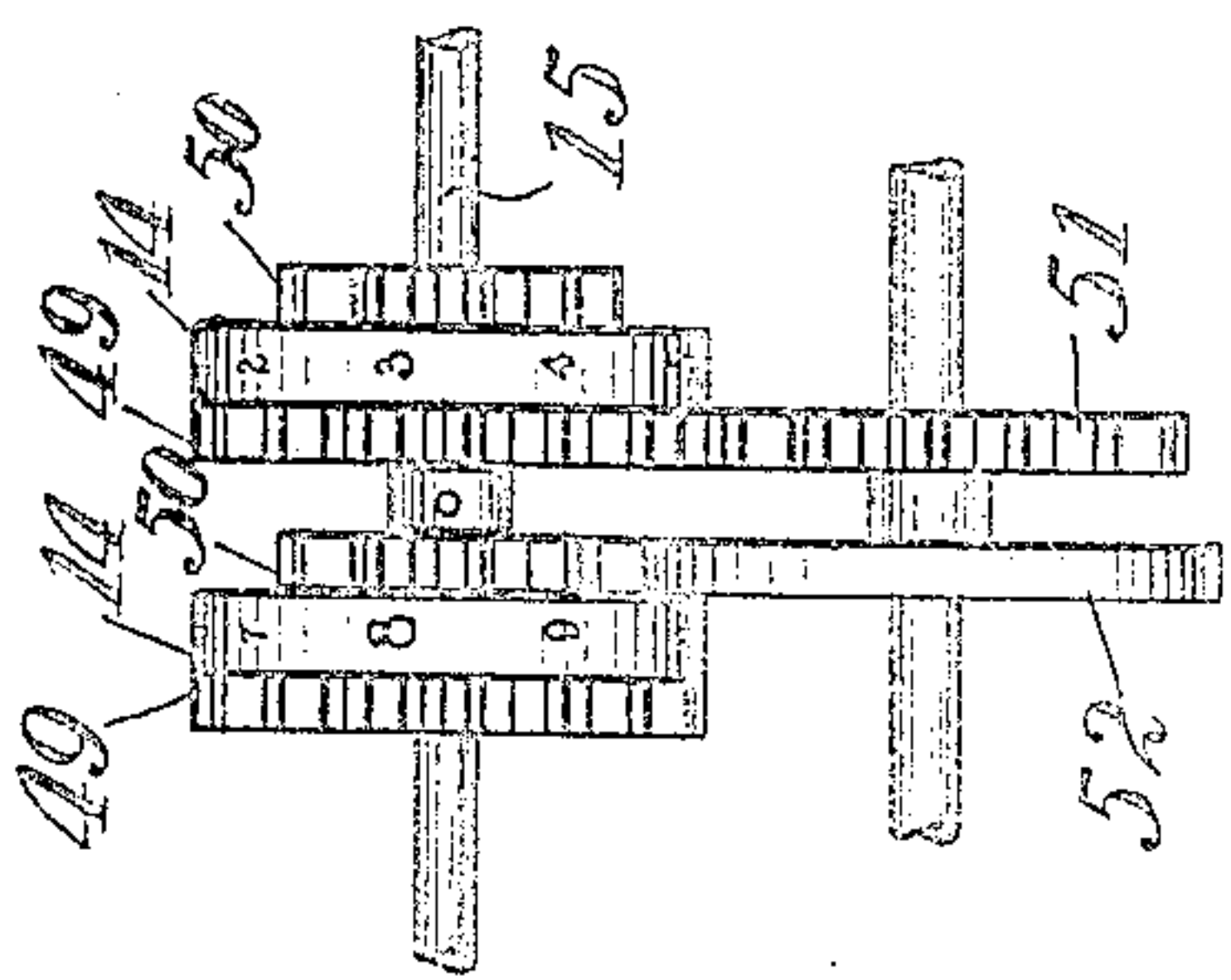
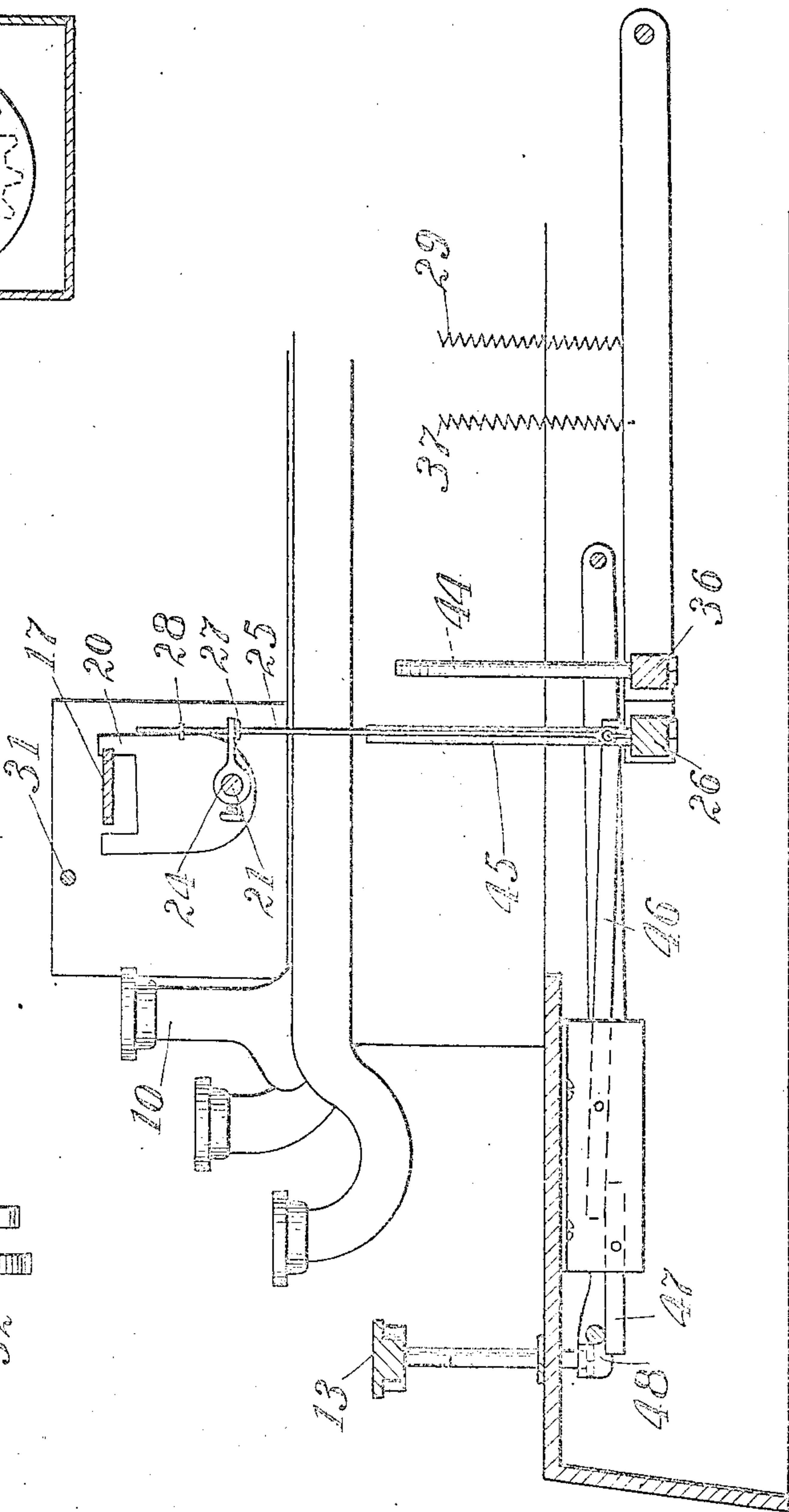


Fig. 5

Fig. 7



Witnesses:
 Edwin Phelps
 Mary W. Hillman

Inventor:
 Charles H. Gill
 By *Rumrider, Rumrider*
 Attorneys.

UNITED STATES PATENT OFFICE.

CHARLES H. GILL, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-FOURTH TO ROY O. RANDALL, OF CHICAGO, ILLINOIS, AND ONE-FOURTH TO RAUS RICHEY, OF STRONGHURST, ILLINOIS.

ADDING ATTACHMENT FOR TYPE-WRITERS.

No. 924,759.

Specification of Letters Patent.

Patented June 15, 1909.

Application filed November 16, 1908. Serial No. 462,330.

To all whom it may concern:

Be it known that I, CHARLES H. GILL, a citizen of the United States of America, and a resident of Chicago, Cook county, State of Illinois, have invented certain new and useful Improvements in Adding Attachments for Type-Writers, of which the following is a specification.

The main objects of this invention are to provide an improved, simple and inexpensive form of adding mechanism particularly adapted for attachment to typewriters; to provide a device of this class which may be readily adapted to the present construction of standard makes of typewriters without requiring rearrangement of the parts thereof; to provide, in a device of this class, improved means independent of the typewriter carriage for automatically causing the numeral keys which are successively depressed in writing a number to successively operate the proper denomination wheels of the adding mechanism; to provide an improved form of carriage and escapement mechanism for adding devices, whereby the wheels will be prevented from overrunning or from accidentally turning back through sudden or violent operation of the operating mechanism; to provide an improved arrangement whereby the adding mechanism will, at the will of the operator, add numbers which are successively written, regardless of the position of such numbers on the sheet which is being written, or regardless of whether the numbers are written in columns or in rows, and without requiring any special setting of the adding mechanism with respect to the typewriter carriage; to provide improved mechanism for causing the shifting of the adder carriage by means of the space bar of the typewriter as well as by the numeral keys; to provide improved and simple means for throwing the adding mechanism into and out of operation; to provide simple mechanism for causing the adding mechanism to operate in a reverse direction for subtracting; and to provide improved means for causing the numeral keys to rotate the computing wheels proportionately to the number of units in the numerals to which the respective keys correspond.

These objects are accomplished by the device shown in the accompanying drawings, in which: Figure 1 is an isometric perspective of an adding attachment for typewriters

embodying this invention, the frame and mechanism of the typewriter being omitted for the purpose of clearly showing the relation of the various parts of the attachment to each other. Fig. 2 is a front elevation of the same, showing its position with respect to the keyboard of the typewriter. Fig. 3 is a plan of the same, the keyboard of the typewriter being included, but the remaining parts of the typewriter mechanism being omitted. Fig. 4 is a section on the line 4—4 of Fig. 2. Fig. 5 is a detail of one of the trains of gears by means of which the count is "carried" from one computing wheel to another of the next higher denomination. Fig. 6 is a side elevation of the same, showing the position of the parts within the casing. Fig. 7 is a section on the line 7—7 of Fig. 3. Fig. 8 is a detail of the mechanism which limits the movement of the master pinion and thereby prevents "overthrow" of the computing wheels.

In the drawings, the numerals 1, 2, etc., to 0 designate the keys which when depressed cause the respective numerals to be written by the typewriter; 10 designates the key levers; 11, the typewriter frame; 12, the typewriter carriage as a whole; and 13, the "space" key or bar.

In the construction shown in the drawings, the computing wheels 14 are loosely journaled on a fixed shaft 15 in the casing 16, which casing is mounted upon a carriage 17 which is in the form of a bar slidably mounted in suitable supports on the typewriter frame. The carriage 17 is normally urged toward the left-hand limit of its movement by means of a spring 18, and is provided with a knob 19 whereby it may be pushed toward the right against the action of said spring. The range of movement of the bar 17 depends upon the number of computing wheels 14 which are provided in the adder attachment, and the movement of the adder carriage 17 is controlled by an escapement 20 in a manner somewhat similar to the control of a typewriter carriage. The specific escapement mechanism is, however, different, as will hereinafter appear.

The escapement 20 is in the form of a pawl carried by the shaft 21 and adapted to rock so as to alternately engage the rack teeth 22 and 23 at respectively opposite sides of the bar 17. The teeth 22 and 23 are in staggered relation to each other. An arm 24

secured to the shaft 21 slidably engages a link 25 which is connected to a swinging member 26 operated by each of the numeral key levers 10 and also by the space bar 13.

5 The link 25 is provided with two shoulders 27 and 28, which limit the play of said link in the arm 24 and cause the escapement pawl 20 to shift as the member 26 approaches either limit of its movement, but to be un-
10 affected by the movement of the member 26 in intermediate positions. The springs 29, which normally urge the member 26 to the upper limit of its movement, thus nor-
15 mally hold the pawl 20 in the position shown in Fig. 1.

The teeth 22 on the adder carriage correspond to the successive positions of said carriage which will bring successive computing wheel gears into mesh with the master
20 pinion 30 by means of which the computing mechanism is operated. In the form shown, the master pinion 30 is fixed upon a shaft 31 journaled in the supporting frame and provided with a second pinion 32 which ex-
25 tends through an aperture 33 in the operating member 34. The operating member 34 is vertically disposed and is provided with rack teeth 35 at opposite sides of the aperture 33. The two sets of rack teeth are
30 spaced apart so that but one at a time may mesh with the teeth of the pinion 32. The lower end of the member 34 is pivotally connected with a second swinging frame or mem-
ber 36 normally urged upward by springs 37.
35 The upper end of the operating member 34 is guided between rollers 38 journaled upon a slide 39 having a transverse movement sufficient to carry either set of rack teeth on the member 34 into mesh with the pinion 32.
40 The slide 39 is normally urged by a spring 40 so as to hold the member 34 in such position that it will rotate the pinion 30 in the direction for increasing the count of the computing wheels during the downward stroke of
45 the member 36. A pivoted detent lever 41 is provided for holding the slide 39 at the opposite limit of its movement, so that the downward movement of the member 34 will rotate the pinion 30 in the direction for re-
50 ducing the count of the computing wheels during the downward movement of the member 36. The slide 39 and detent lever 41 are provided with coacting shoulders 42 for this purpose. The spring 43 normally urges
55 the lever 41 upwardly so that the shoulders 42 will engage when the slide 39 is pushed back into the subtracting position.

In order that the different numeral key levers will each depress the member 36 to a
60 different extent so as to cause a movement of the computing wheels proportionate to the number of units in the respective numerals which are being written, said frame 36 is provided with a series of upright rods
65 44 of successively different lengths so that

their upper ends serve as shoulders against which the corresponding key lever 10 may abut. The length of the rods 44 is so proportioned that the key lever 10 which corresponds to the numeral 1 will, when depressed 70 the full limit of its movement, cause the master pinion 30 to rotate through one unit angular interval so that it will rotate the computing wheel with which it is connected enough to change its count by unity. Simi- 75 larly, the key lever 10 which corresponds to the key of the numeral 9 will rotate the pinion 30 through nine unit intervals.

The member 36 has no rod 44 in position for engaging the zero key, so that when 0 is 80 written by the typewriter the count of the computing wheels will remain unchanged. In order to cause the adder carriage to shift after the writing of each numeral, so that the various numerals of which a number is com- 85 posed will be added to or subtracted from the count of the proper denomination wheel, the member 26 which operates the escapement of the adder carriage is provided with a series of rods 45, one for each key lever 10, 90 including that of the numeral 0. These rods 45 are all of the same length. The member 26 is also connected with the space bar 13 so as to be operated thereby. In the form shown, this connection consists of a system 95 of levers 46 and 47 which are operated by the lever 48 which carries the space bar 13.

The "carrying" of the count from one computing wheel 14 to the next is accomplished by means of a train of gears comprising a gear 49 secured against the left-hand 100 face of each counting wheel 14, a gear 50 of considerably smaller diameter than the gear 49 secured to the right-hand face of each computing wheel 14, and gears 51 and 52 which 105 are journaled in fixed relation to each other and which respectively mesh with the gears 49 and 50. In the form shown, the gears 49 and 51 are of equal diameters, so that the gear 51 will make one revolution for each 110 revolution of its corresponding computing wheel 14. The gear 52 is a mutilated gear provided with a single tooth 53, but the pitch diameter of the mutilated gear 52 is such that the toothed part of its periphery 115 will move through such angular interval during each one-tenth of a revolution of the gear 52, that it will never stop in position to interfere with the free rotation of the corresponding gear 50. This is illustrated in 120 Fig. 6, where the tooth 53 is shown by full lines in a position clear of the teeth of the gear 50 and by dotted lines in its succeeding position, where it will also be clear of the gear 50 after having rotated said gear 50 125 through an angular interval of one-tenth of a revolution, corresponding to the unit interval of movement of the respective computing wheel 14.

In order to insure that the numerals on the 130

computing wheels which are visible through the window 54 of the casing will aline with each other, and in order to prevent overthrow of the computing wheels 14, each of the gears 50 is provided with ten teeth, and a spring detent 55 is mounted adjacent to each of the gears 50 so as to engage the successive tooth spaces as the wheel is rotated and thereby insure the proper alining of the numerals which appear at the window. Each of the gears 50 meshes with an individual intermediate gear 56 which extends through the casing 13 into position for meshing with the master pinion 30.

The computing mechanism may be thrown out of operation by depressing a key 57 (Fig. 4) and then shifting said key so that the shoulder 58 thereon will engage a shoulder on the frame 11. This key is carried by a lever 59 normally urged upward by the spring 60, so that in its normal position it will not interfere with the operation of the adding attachment. The arm 61 of the member 36 extends across the top of the member 26, and also extends forward into such position that it will be engaged by the lever 59 when the key 57 is depressed. Thus, when the key 57 is depressed and locked by means of the shoulder 58, both of the members 36 and 26 are thereby pushed downward so that the key levers of the typewriter will be free to operate without having to overcome the additional pressure of the springs 29 and 37, which pressure is added to the resistance of said keys when the adding attachment is in operation. A spring 62 bears between the shank of the key 57 and the lever 59 to normally urge the shoulder 58 to a position clear of the frame.

In order to prevent "overthrow" of the computing wheels and insure that the master pinion 30 will be positively locked after it has registered the proper amount upon the computing wheels, a detent 63 is slidably mounted upon the supporting frame and connected by a link 64 with the member 26 so that when said member is at its lower limit of movement said detent 63 will engage the pinion 32 and lock it against further movement until said detent is released by the upward movement of the number 26.

The operation of the device shown is as follows:—When it is desired to throw the adding mechanism out of service, the operator presses a button 57 and at the same time exerts a forward pull which causes the shoulder 58 to engage the frame at the front of the aperture through which the shank of the button 57 operates. The strength of the spring 62 is insufficient to overcome the friction between the detent 58 and the shoulder which it engages, and the lever 59 therefore remains depressed and bears against the arm 61, holding the frames 26 and 36 at their lower limit of movement, and thereby relieving

the numeral keys of the typewriter of the work of moving said frames against the springs 29 and 37.

When the operator desires to use the adding mechanism, he first pushes the button 57 backward so as to release the shoulder 58 from the frame. The spring 60 then lifts the arm 59, releasing the arm 61 and permitting the frames 36 and 26 to rise to the upper limit of their movement. The adder carriage 17 is then pushed toward the right by means of the button 19 as far as it will go. The shoulder 66 of the knob 19 abuts against the supporting frame and stops the movement of the carriage at a point where the gear train of the computing wheel of highest denomination is in mesh with the pinion 30. In the form shown, the adding attachment is provided with six computing wheels, but there may, of course, be any desired number of such wheels.

Assume now that the operator wishes to write a column of numbers. Before writing each number he would push the adder carriage to the right to the limit of its movement, and also set his typewriter carriage to the position for writing a figure of the highest denomination. This would be the position to which he would set his tabulating device if the typewriter were provided with one. Then, if the number which is to be written contains a less number of figures than would be contained in a number of said highest denomination,—for instance, if he wishes to write a number with three figures, he would depress the space bar 13 of the typewriter three times, so as to cause the typewriter carriage to come to proper position for writing the first figure of the number in its proper column. As the space bar 13 also operates the adder carriage, said carriage would simultaneously shift so that the pinion 30 would mesh with the gear train of the computing wheel of the corresponding denomination. If, for example, the operator wishes to write the number 160; after setting the typewriter carriage and the adder carriage to the proper position as hereinbefore described, he would depress the numeral key which is used for writing the figure 1. This would cause the figure 1 to be written in the usual manner, and the depression of the key lever 10 would cause it to engage the corresponding pin 44 of the frame 36, which pin is of such length that the pinion 30 would be rotated through a unit interval and cause the numeral 1 to appear upon the corresponding wheel at the window 54. The downward movement of the key lever 10 would also depress the frame 26 through the engagement of the lever 10 with the rod 45, and as the frame 26 approaches the lower limit of its movement, the shoulder 28 on the link 25 abuts against the arm 24 and shifts the pawl 20 so that the front arm thereof

engages one of the teeth 23, and the rear arm thereof releases the tooth 22 with which it has been engaged. As the teeth 23 and 22 are in staggered relation to each other, the spring 18 thereupon advances the carriage one-half of the "space" interval. As soon as the key 1 is released, the frames 26 and 36 are drawn upward by their springs. This movement through the action of the rack 34 returns the pinion 30 to its normal initial position while it is in an intermediate position and out of mesh with any of the gear trains of the computing wheels. As the frame 26 approaches the upper limit of its movement, the shoulder 27 strikes the arm 24 and rocks the escapement pawl 20 forward so as to bring its rearward arm into engagement with the next tooth 22, and the carriage 17 again advances another half step, bringing the master pinion 30 into mesh with the next gear train, which under the circumstances assumed is fourth from the left of Fig. 1. The operator next depresses the key by which the numeral 6 is written. This in similar manner causes the master pinion 30 to rotate six unit intervals, and causes the second counting wheel from the right to indicate 6 at the window 54. It also causes the operation of the spacing escapements both of the typewriter and the adding attachment so that the carriages shift to the position for writing and adding the last figure of the number. The operator finally depresses the 0 key, which causes the writing of the numeral 0 by the typewriter and causes the escapement of the carriages in the manner hereinbefore described, but, as there is no pin 44 corresponding to the 0 key, the master pinion 30 is not rotated, and no change is made in the position of the counting wheel of lowest denomination. The platen roller of the typewriter is then advanced so as to write the succeeding number, the typewriter carriage is set to proper position, and the adder carriage is pushed to the right to the limit of its movement. The next number is written in a similar manner, the space bar being operated until the carriages come into position for writing the first numeral of the number.

If the numbers are being written in a row, instead of in a column, the adder carriage is set by hand to bring it into position for operating the wheel of proper denomination, and in other respects the operation is as hereinbefore described.

The sum of all of the numbers written appears at the window 54, and when the operator writes this sum he reads it from the computing wheels at the window 54. Previous to writing the total, he pushes inward the knob 67 on the slide 39, so as to shift the rack which is used for subtracting into mesh with the pinion 32, and then as each numeral of the sum is written, the counting wheel of

corresponding denomination is turned backward a corresponding number of unit intervals, and accordingly registers 0 at the window 54. The act of writing the total thus resets the computing device to zero. After having written the total, the operator depresses the knob 68 which releases the slide 37 and allows it to return the member 34 so that the teeth which cause adding are brought into mesh with the pinion 32.

Although but one specific embodiment of this invention is herein illustrated, it will be understood that numerous details of the construction shown may be altered without departing from the spirit of this invention.

I claim:

1. In a device of the class described, the combination of a computing mechanism comprising a plurality of computing wheels, mechanism connecting adjacent pairs of said wheels and adapted to carry the count from one wheel to the next, individual gears for operating the respective computing wheels, a master pinion adapted to mesh with either of said individual gears, a carriage arranged to relatively shift said computing mechanism and master pinion, a series of pivoted numeral key levers, a pair of movable members, each pivoted on an axis parallel with the axes of the key levers, one of said members extending across the paths of said numeral key levers, escapement mechanism operated by said one member and adapted to shift said carriage one interval so as to carry said master pinion into mesh with the next succeeding computing wheel gear through the movement of any of said numeral key levers, shoulders on the other of said members being so disposed with respect to the respective key levers as to cause said other member to be shifted a distance proportionate to the number of units in the numeral to which said key lever corresponds, and mechanism operated by said second member for rotating said master pinion through an angular interval proportionate to the movement of said second member.

2. The combination of a typewriter, a typewriter carriage, an adding attachment mounted on the typewriter independent of the carriage thereof and comprising a series of computing wheels, a master mechanism adapted to individually rotate said wheels, an adder carriage adapted to shift said wheels and master mechanism relatively to each other for causing the individual operation of different computing wheels, a series of numeral keys each adapted to operate said master mechanism to an extent proportionate to the numeral to which such key corresponds, mechanism independent of the typewriter carriage for successively shifting said adder carriage through the operation of each of said numeral keys, a space bar for shifting said typewriter carriage, and mechanism op-

erated by said space bar for simultaneously shifting said adder carriage.

3. The combination of a series of computing wheels, a master pinion for individually operating said wheels, a second pinion arranged to rotate said master pinion, a reciprocating member having thereon two relatively fixed sets of rack teeth adapted to respectively mesh with opposite sides of said second pinion for rotating it in opposite directions through corresponding movements of said reciprocating member, a guide frame within which said member is slidable and adapted to be shifted for carrying said racks alternately into mesh with said second pinion at will, means normally urging said guide frame toward one limit of its movement, a detent adapted to secure said guide frame at the other limit of its movement, and a key adapted to withdraw said detent.

4. The combination of a series of computing wheels, rack and pinion master mechanism for operating them individually, a carriage for relatively shifting said wheels and master mechanism, a series of numeral keys, a member movable to a respectively different extent by each of said keys and adapted to proportionately move said master mechanism, a second member adapted to be moved by each of said keys and controlling the shifting of said carriage, and means operated by said second member and adapted to limit the movement of said master mechanism and thereby prevent overthrow of the computing wheels through violent operation of said keys.

5. The combination of a series of computing wheels, rack and pinion master mechanism for operating them individually, a carriage for relatively shifting said wheels and master mechanism, a series of numeral keys, a member movable to a respectively different extent by each of said keys and adapted to proportionately move said master mechanism, a second member adapted to be moved by each of said keys and controlling the shifting of said carriage, and a movable detent connected with said second member and adapted to engage said master mechanism when said second member has been moved to a certain predetermined position and thereby prevent overthrow of the computing wheels through violent operation of said keys.

6. The combination of a series of computing wheels, a master mechanism adapted to individually operate said wheels, a carriage for causing said master mechanism to be successively brought into operative relation with different wheels of said series, a series of numeral keys, each adapted to operate said master mechanism, means normally urging said master mechanism to a certain normal initial position, escapement mechanism comprising two racks provided

with teeth located in staggered relation to each other, an escapement pawl arranged to alternately engage said racks for permitting a step by step movement of said carriage, one of said racks being in such relation with said carriage and said escapement pawl as to stop said carriage in successive positions which bring said master mechanism into operative relation with successively different computing wheels, and the other rack having such relation with said pawl and carriage as to hold said carriage in positions corresponding to intermediate positions of said master mechanism wherein it is out of operative relation with said computing wheels, and means connecting said escapement mechanism with said master mechanism so as to permit said carriage to shift only while said master mechanism is at one of the limits of its movement.

7. In a device of the class described, the combination of a supporting frame, a carriage movably mounted on said frame, means normally urging said carriage in one direction, escapement mechanism comprising a pair of racks having teeth in staggered relation to each other and a reciprocating pawl movable alternately into engagement with said racks to permit the step by step escapement of said carriage, a key movably mounted in said frame, a member mounted to reciprocate in said frame, being adapted when engaged by said key to be shifted in one direction, means normally urging said member to a certain normal initial position, and means connecting said member with said escapement mechanism, whereby said pawl will be shifted from one rack to the other when said member arrives at each limit of its movement and whereby said pawl will remain in fixed relation to said racks during intermediate positions of said member.

8. In a device of the class described, the combination of a carriage, a pair of racks connected in fixed relation therewith, means normally urging said carriage in one direction, an escapement pawl for causing the step by step escapement of said carriage in the opposite direction, said pawl being pivotally mounted and adapted to oscillate between positions for alternately engaging said racks, an oscillating member, a link interposed between said oscillating member and pawl and having sliding connection with one of them, and shoulders on said link adapted to limit its sliding movement for causing said pawl to be shifted by said member as said member approaches opposite limits of its movement, but to remain stationary at intermediate positions of said member.

9. The combination of a series of computing wheels, rack and pinion master mechanism for operating them individually,

a carriage for relatively shifting said wheels and master mechanism, a series of numeral keys, a member movable to a respectively different extent by each of said keys and
5 adapted to proportionately move said master mechanism, a second member adapted to be moved by each of said keys and controlling the shifting of said carriage, and means adapted to simultaneously throw both of

said members into and out of range of said 10 keys.

Signed at Chicago this 12th day of November, 1908.

CHARLES H. GILL.

Witnesses:

EUGENE A. RUMMLER,
MARY M. DILLMAN.