

J. A. TOOMEY.
 ADDING MACHINE.
 APPLICATION FILED MAY 10, 1909.

973,727.

Patented Oct. 25, 1910.

3 SHEETS-SHEET 1.

FIG. 1

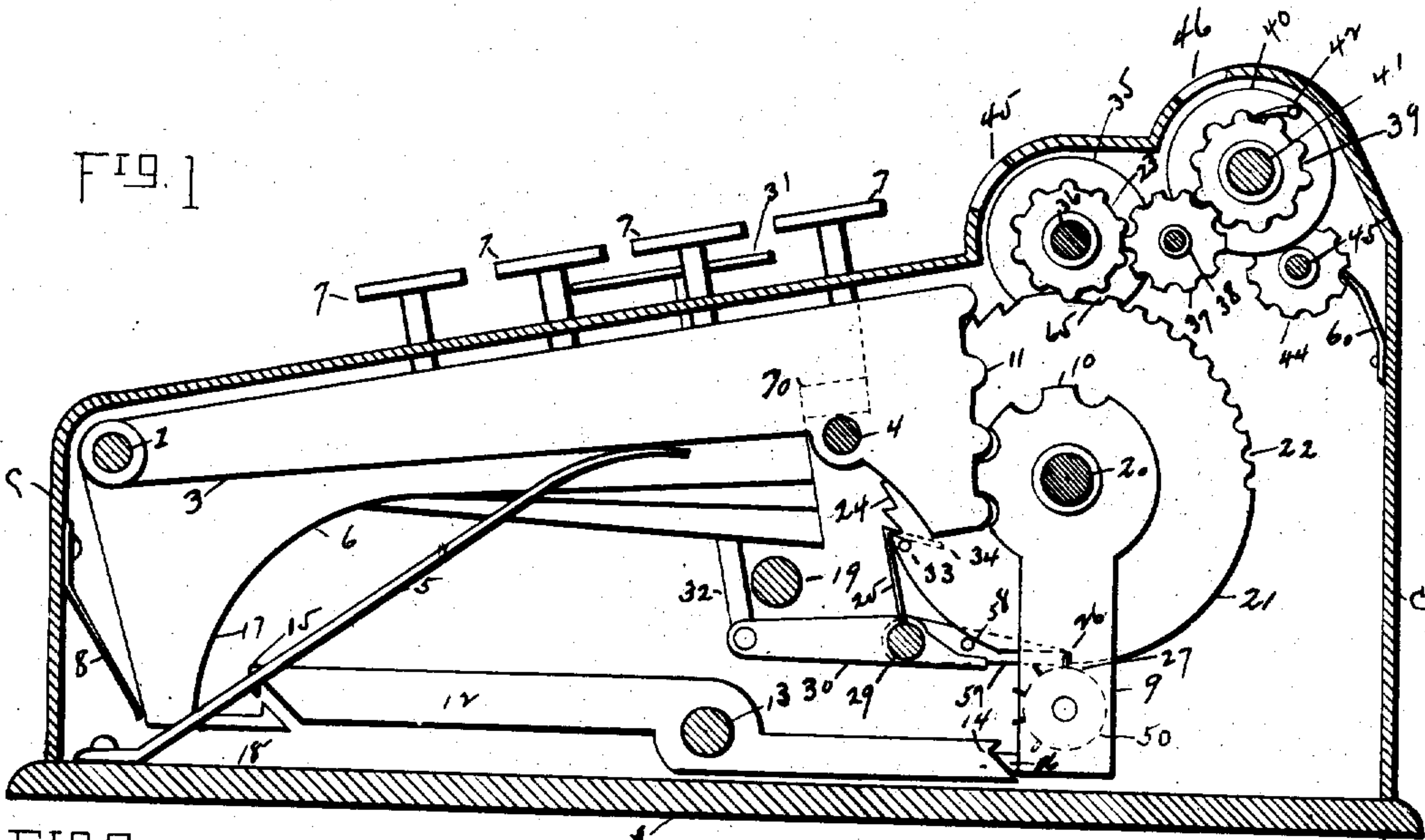
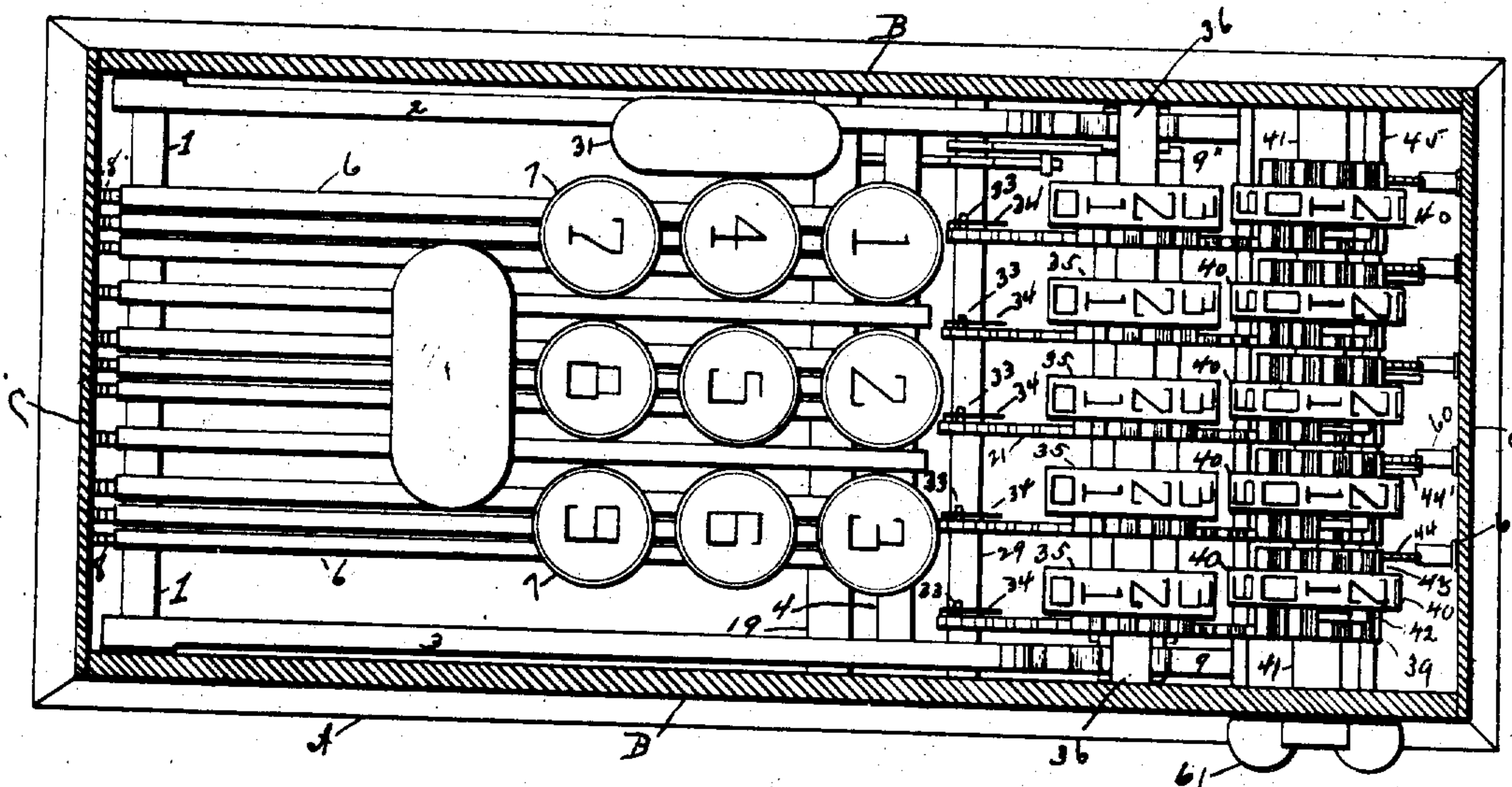


FIG. 2



WITNESSES

Caroline L. Toomey
Elizabeth Atwell Neal

John A. Toomey
 INVENTOR

J. A. TOOMEY.
 ADDING MACHINE.
 APPLICATION FILED MAY 10, 1909.

973,727.

Patented Oct. 25, 1910.

3 SHEETS—SHEET 2.

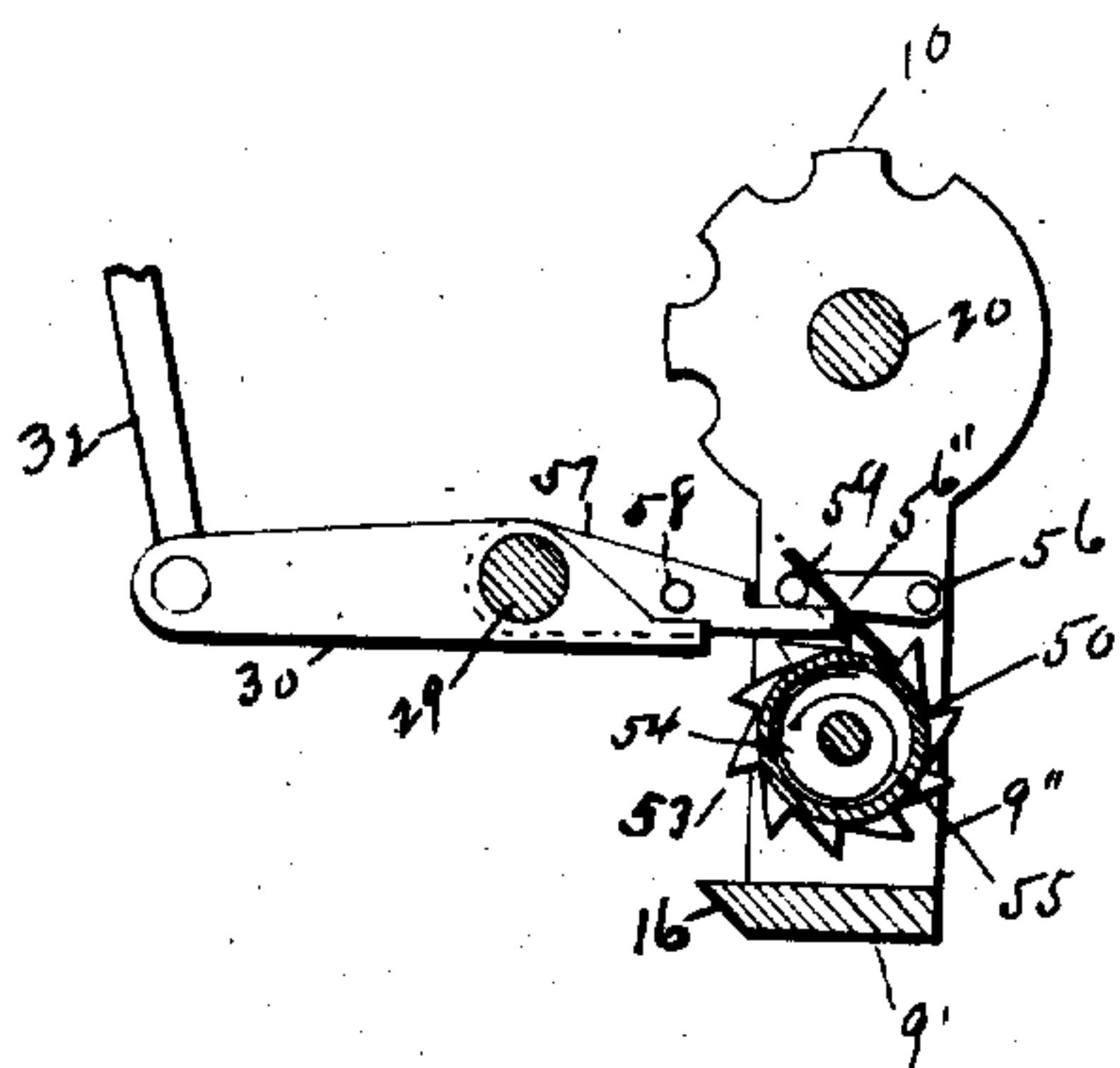


Fig 3

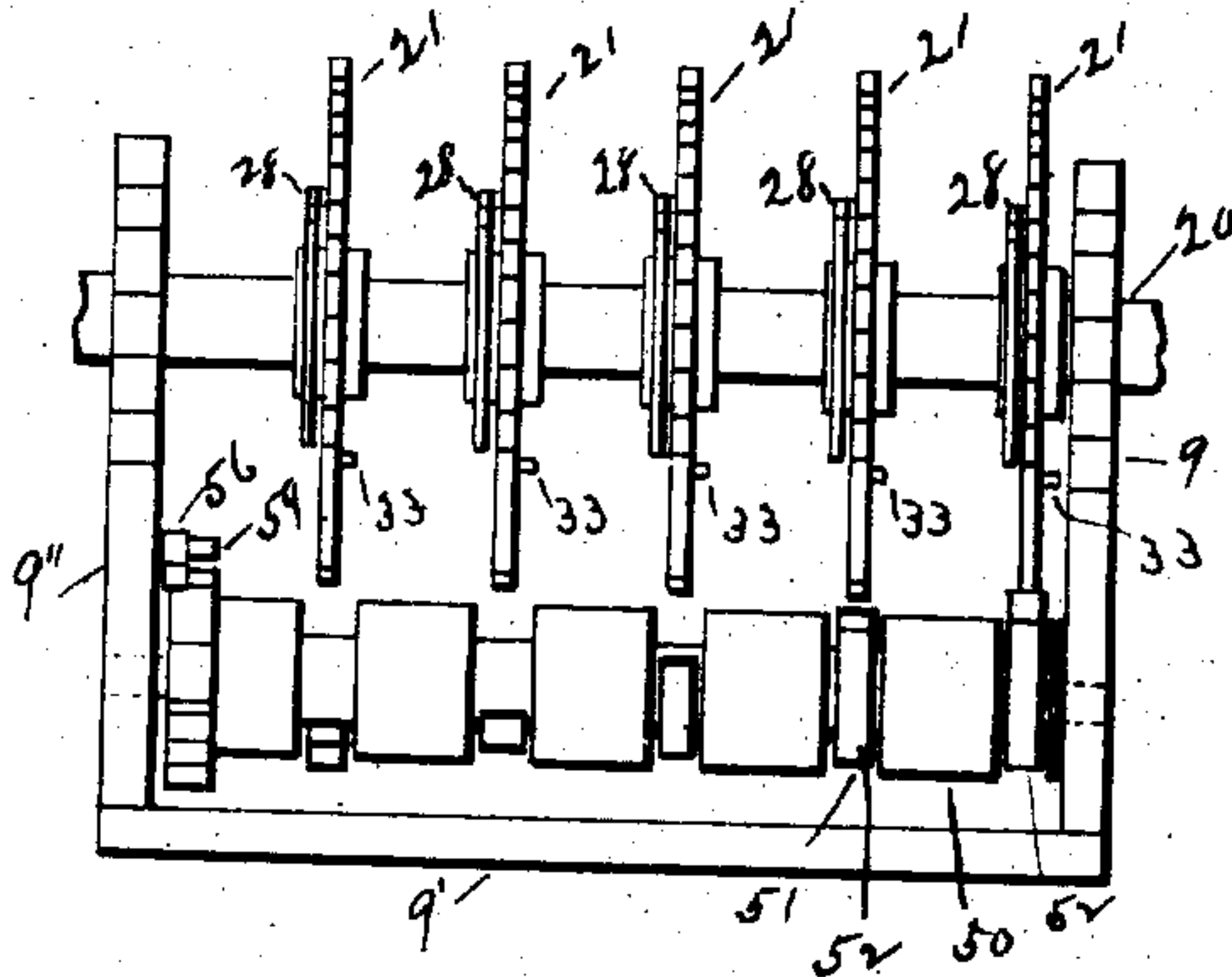


Fig 4

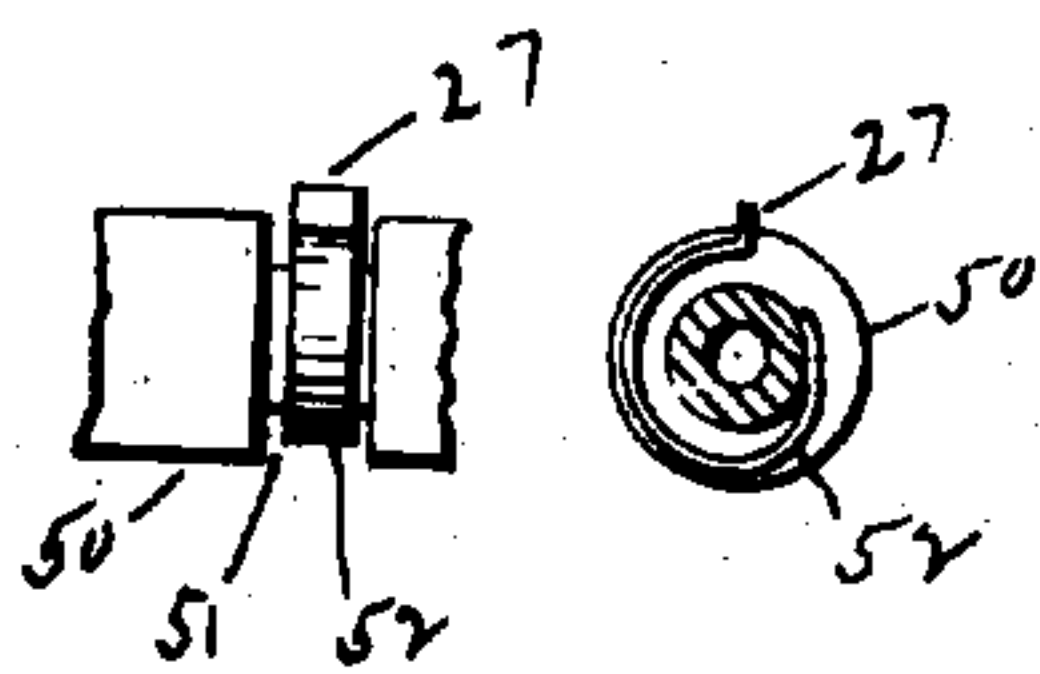


Fig 5

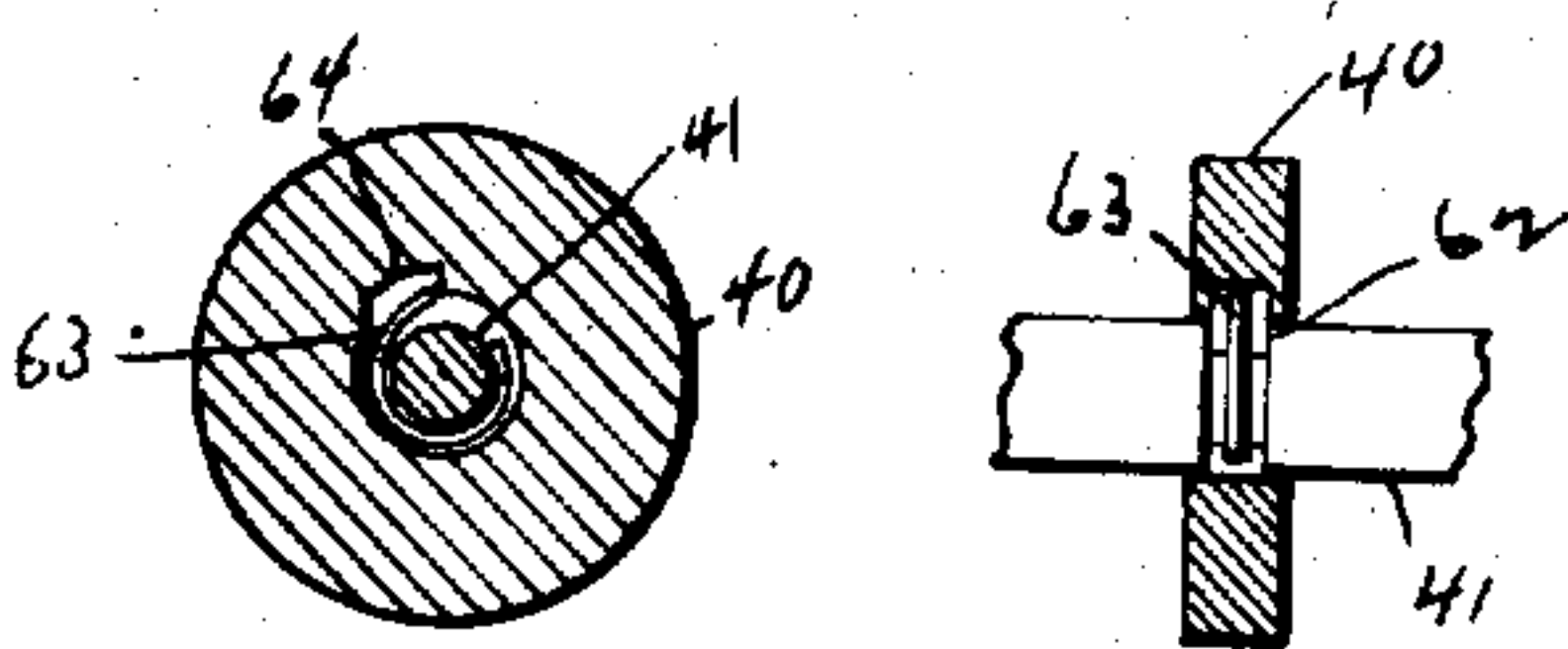


Fig 6

WITNESSES

Caroline L. Toomey
Elyakth Still Deal

John A. Toomey
 INVENTOR

J. A. TOOMEY.
 ADDING MACHINE.
 APPLICATION FILED MAY 10, 1909.

973,727.

Patented Oct. 25, 1910.

3 SHEETS—SHEET 3.

Fig. 7

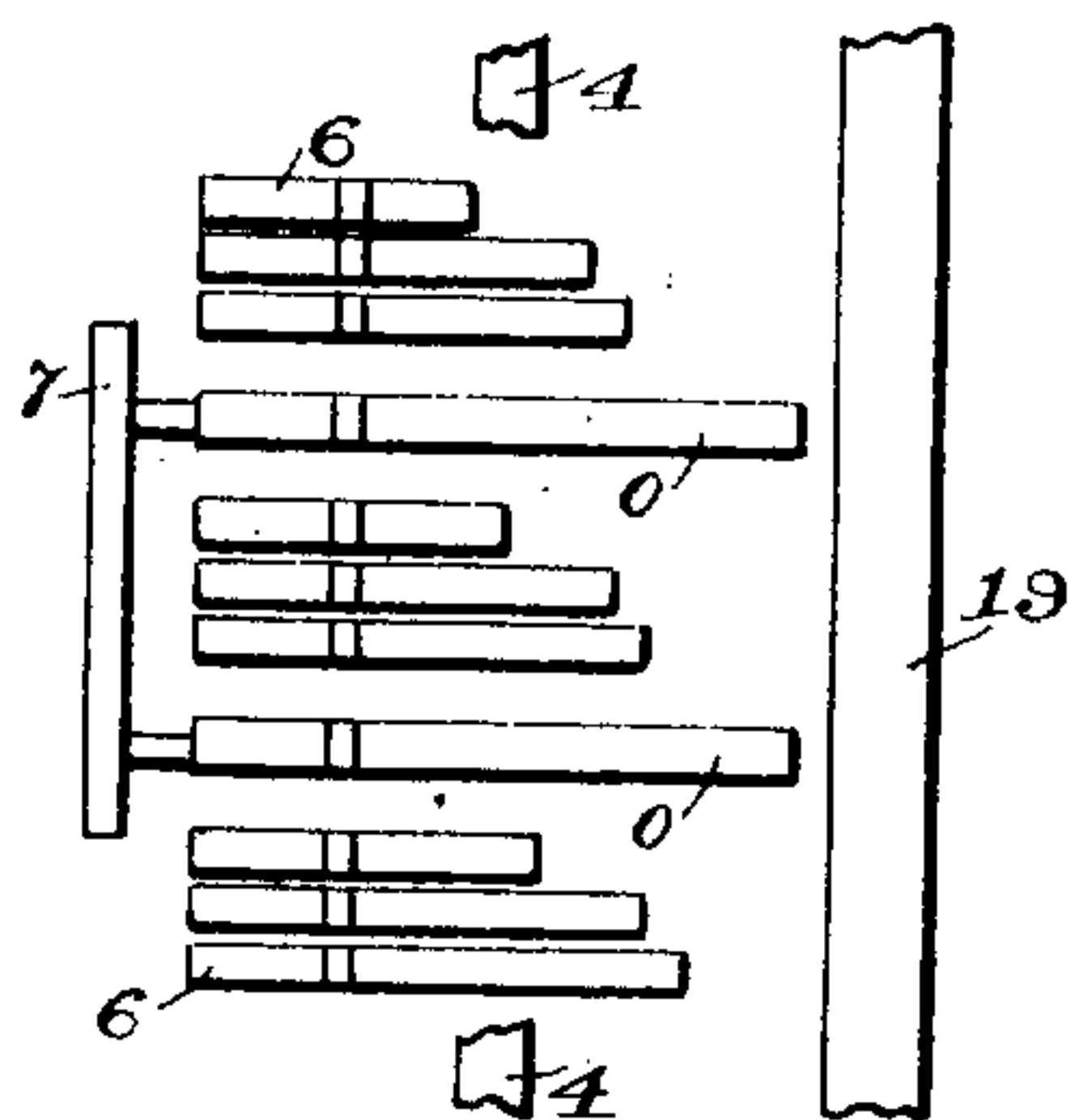


Fig. 10

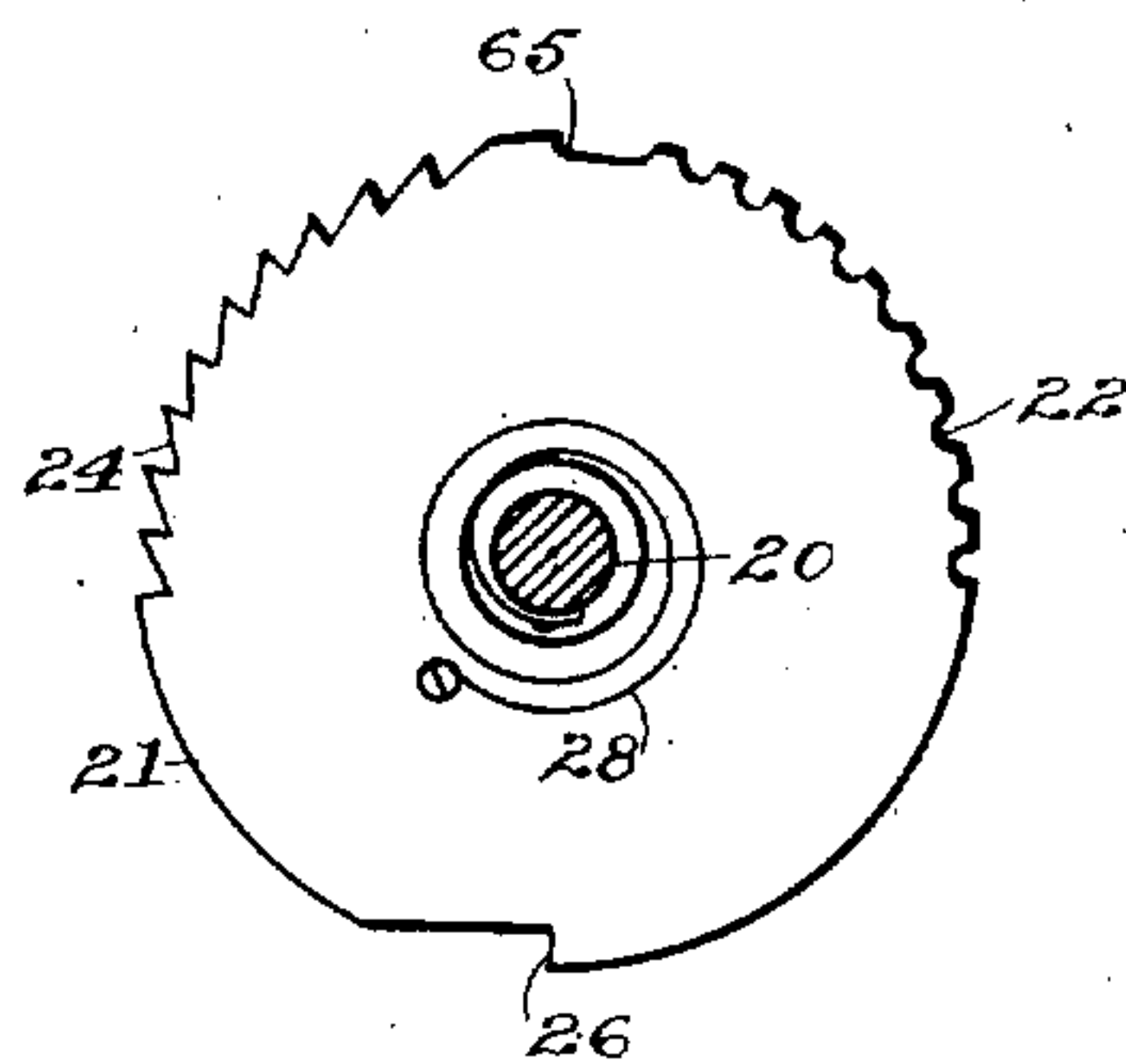


Fig. 8

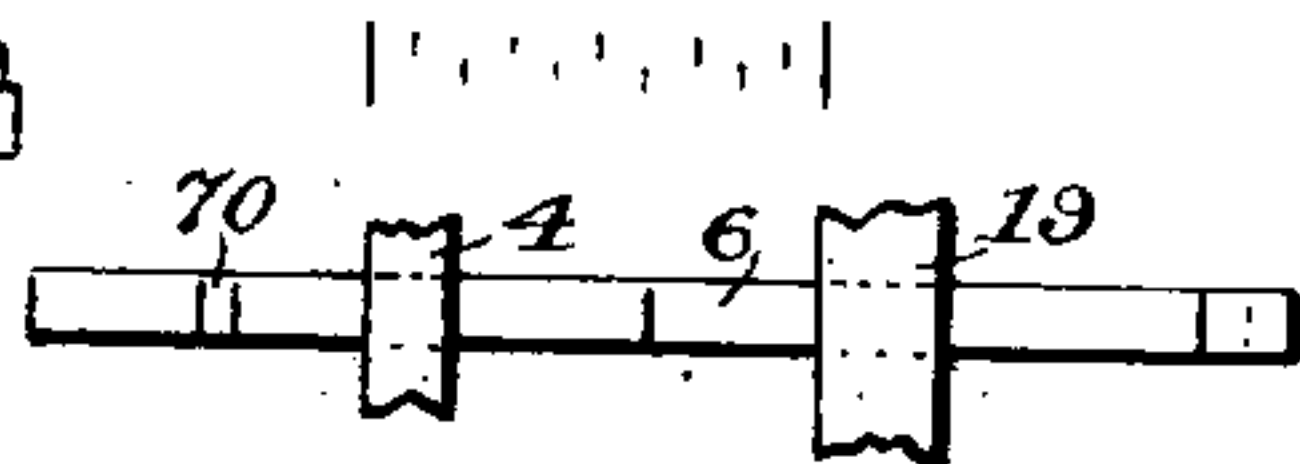


Fig. 11

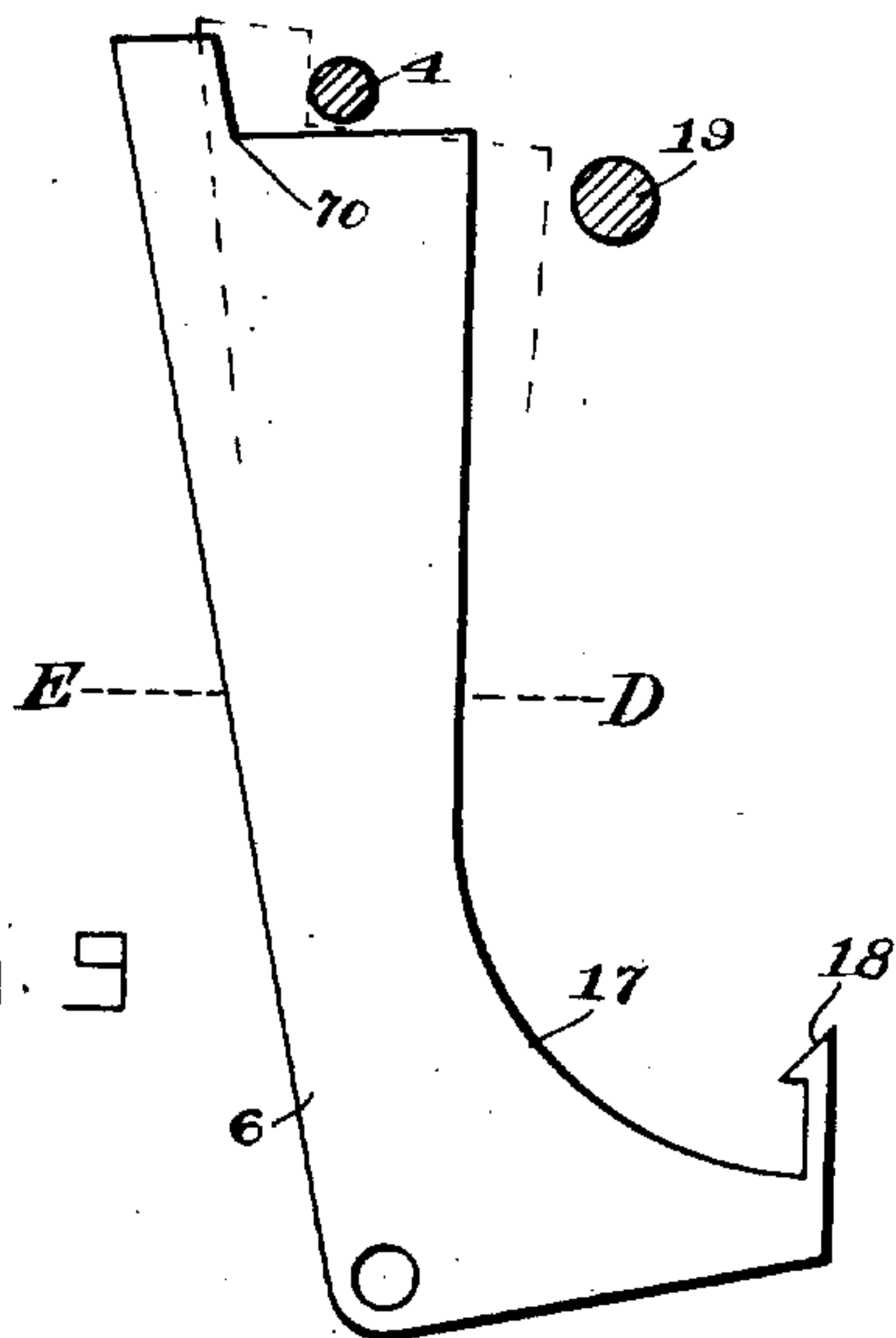
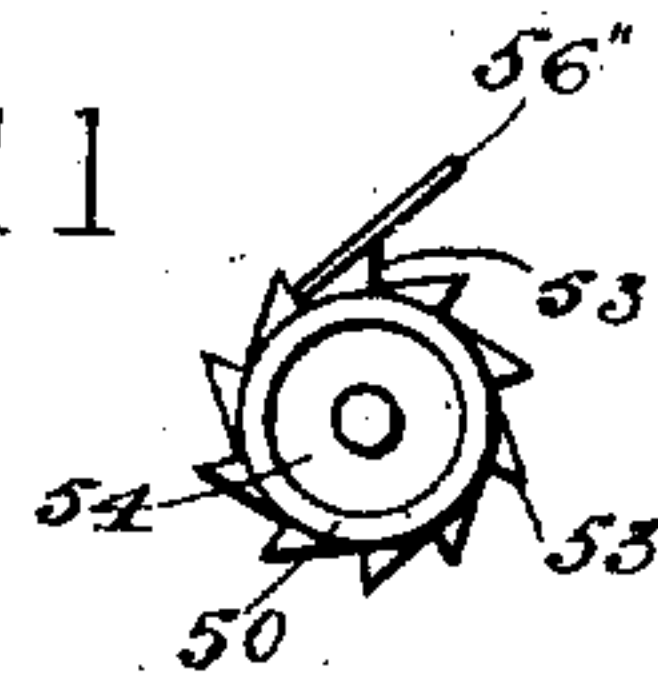


Fig. 12

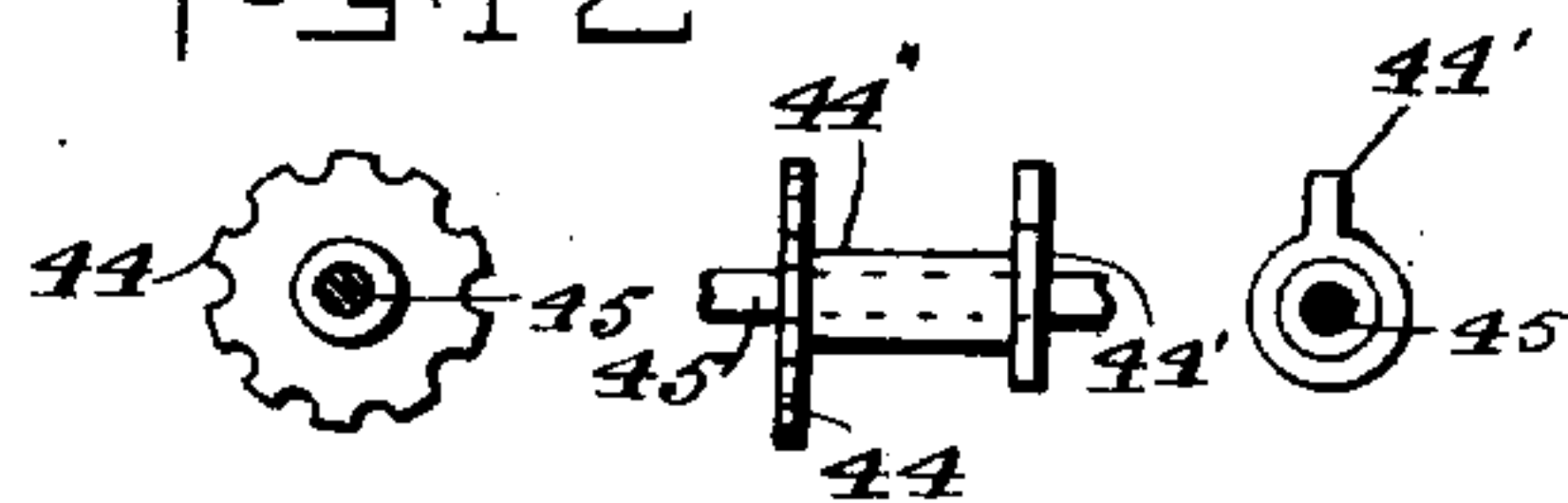


Fig. 9

WITNESSES

Carrie Loyola Toomey
 Elizabeth Atwill Neal

John A. Toomey
 INVENTOR

UNITED STATES PATENT OFFICE.

JOHN A. TOOMEY, OF SANTA MONICA, CALIFORNIA.

ADDING-MACHINE.

973,727.

Specification of Letters Patent.

Patented Oct. 25, 1910.

Application filed May 10, 1909. Serial No. 495,175.

To all whom it may concern:

Be it known that I, JOHN A. TOOMEY, a citizen of the United States, residing at Santa Monica, in the county of Los Angeles and State of California, have invented a new and useful Adding-Machine, of which the following is a specification.

My invention relates to improvements in adding machines, in which the depression of keys operates the mechanism; and the objects of my invention, are, first to provide a mechanism in which one set of ten keys, shall add any number, limited only by the places or columns allowed by the machine; second, by reducing the number of keys to ten, to reduce the number of parts and produce a machine very compact, and of light weight, and easily portable; third, to provide a simple means of indicating each amount added, separately from the total of the addition; fourth, to provide a means for locking all keys except the one depressed so as to prevent the operator working faster than the machine; fifth, to provide a simple means for returning all the indicator wheels to the cipher. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1— is a vertical section of the entire machine. Fig. 2— is a top view of the machine as it appears after the removal of the casing. Fig. 3— is a view of the mechanism used to advance the adding device, from one place in the number to the next higher place, and of reversing the mechanism when the number has been added. Fig. 4— is a view of the adding mechanism showing the spiral arrangement of the spring teeth of the adding device. Fig. 5— shows the construction of the spring teeth of the adding device. Fig. 6— shows the device for returning the indicator wheels to cipher. Fig. 7— sectional view of key bars forward of line D—E. Fig. 9, showing graduated widths, also showing two of the bars (6), united by one key piece (7), forming the tenth or cipher key. Fig. 8— end view of key bar (6). Fig. 9— side view of key bar (6); dotted line showing the depression of key allowed for the numerals 1, 2, 3, 4, before the key bar (6) engages the rod 4. Fig. 10— plan of disk 21, showing the coiled spring 28 attached. Fig. 11— end view of

roller 50, showing 56'' attached to and forming part of ratchet 53. Fig. 12— plan of gear 44 and 44' united by sleeve 44''.

Similar characters refer to similar parts throughout the several views.

A number repeated indicates that the part is duplicated for each column of figures the machine will add.

My invention consists in the employment of certain novelly-formed parts, in the novel disposition and arrangement of the various part, in certain combinations of the latter, and in certain details of construction, all of which will be hereafter specifically referred to.

Having reference to the accompanying drawings, the base A, the sides B—B; and the casing C, constitute the frame work of the machine. The key mechanism consists of a rigid frame, formed of the rod 1, the side pieces 2 and 3 and the rod 4. This frame is pivoted by the rod 1 being journaled in the sides B—B; and may be oscillated on its pivot by being pressed downward at the outer end against the tension of the spring 5. Extending parallel within the said frame are ten bars or key pieces (6), each having a separate finger piece (7), and each held in position by the tension of a separate spring (8). The key bars (6) extend to and engage the rod (4) of the rectangular frame 1, 2, 3, and 4, so that as the keys are depressed the frame is carried downward with them against the tension of the spring (5). Fixed rigidly in the sides B—B' and extending below the frame and keys referred to is the bar 19 in such a manner that as the key bars (6) are depressed they will strike the bar 19 and be stopped by it. The bars (6) are made of graduated widths, so that the distance the frame will be depressed will vary from 1 to 10. To provide for a proper finger movement for the small numerals, one, two, three, the corresponding bars (6) are cut away as indicated by the dotted angle 70 so that they may be depressed against the tension of the spring (8) before the bar (6) engages the rod (4), of the frame and begins the key movement proper. The shaft 20 is rigid in the sides B—B', and forms an axis on which swings the frame 9—9'—9''. The side pieces 9 and 9' are arranged with gear teeth

(10), which mesh with similar teeth (11) on the ends of the side pieces 2—3 of the key frames, so that as the keys are depressed the frame 9—9'—9'' will move in unison with the frame 1—2—3—4—, and will vary in its movements from 1 to 10, according to the key depressed.

Extending parallel with and underneath the key bars (6) are ten parallel bars (12) which are pivoted on the rod (13), said rod (13) being rigid in the sides B—B'. The bars (12) swing freely on the rod (13) and are formed with a V at one end (14), and with a hook (15) at the opposite end. The frame 9—9'—9'' has a beveled edge (16), which engages the V shaped end (14) of the bars (12), in such a way that the bars act as a stop for the frame 9—9'—9''. It is evident that as the key frame is depressed and the frame 9—9'—9'' swings in unison with them, the bars (12) will be released and drop of their own weight or by the pressure of a spring which may be supplied if needed. Each of the ten key bars (6) are arranged with an extension piece (17) on which is formed the hook (18). The construction is such that as the key frame is depressed the frame 9—9'—9'' will swing away from the bars (12) and they will then be released and drop down, so that the hook (15) engages the hook (18) of each key, locking all keys except the one in use. The key in use does not lock, because the hook (18) has moved out of the line of the hook (15). All the keys will remain locked until the key which has been depressed is released, then as the frame 9—9'—9'' swings back into position, the beveled edge (16) will engage the V (14) and lift the hooks (15) from engagement with the hooks (18) and unlock all of the keys.

Loosely mounted on the shaft (20) are circular disks (21), one for each column of figures, which the machine will add. These disks are provided with gear teeth (22), which engage the indicator gear (23) and with beveled teeth (24), which engage the locking device (25), and with a beveled slot (26) which engages the spring teeth (27) of the adding device. Each disk (21) has a coiled spring (28) which is attached by one end to the disk, and at the other end to the shaft (20), so that as the disk is revolved by the adding mechanism, the spring is coiled up, and when the disk is released the spring turns the disk back again to the starting point. The locking device (25) is a series of spring teeth which are set rigid in the shaft (29) and are normally in contact with the beveled teeth (24) of the disks (21), so that as the disks are revolved in the addition, the spring teeth (25) engage the beveled teeth (24) of the disk (21) and holds the disk in the position to which it has been

moved by the adding mechanism. The rod (29) is journaled loosely in the side B—B', and has a rigid cross arm (30), which is connected with the key (31) by the rod (32), so that when the key (31) is depressed it will rock or turn the shaft (29) enough to move the spring teeth (25) out of contact with the beveled teeth (24), allowing spring (28) to turn the disk (21) backward to the starting point. This backward movement of the disk is limited by the stud (33), which is set in the side of each disk (21), coming in contact with the extension (34) of the spring teeth (25). This extension piece (34) being long enough that the rocking of the shaft (29) does not move it out of the range of the stud (33). The gear teeth (22) of the disk (21) engage and turn the gear (23). The gear (23) is rigid with or part of the indicator disk (35), both turn freely on the axle (36). The gear (23) engages and turns the gear (37) which turns freely on the axle (38). The gear (37) engages and turns the gear (39). The gear (39) and the indicator disk (40) turn freely on the axle (41), but both move independently, except for the spring pawl (42), which is attached to the disk (40) and engages the teeth of the gear (39), so that as the gear (39) turns forward it will carry the disk (40) forward with it, but when the gear (39) turns backward, the disk (40) will remain stationary. The disk (40) and the gear (43), are rigidly attached. The gear (43) engages and turns the gear (44). The gear (44) and gear (44') are connected with a sleeve (44') shown in Fig. 12, and turn freely on the shaft (45). The gear (44') has only one tooth to ten teeth of the gear (44), and engages the gear (44) of the next higher set of gear. The amount added each time appears at the opening (45), in the casing, on the indicators (35), and the total amount added at the opening (46) on the indicators (40). It is to be understood from the foregoing that the disk (21), and the set of gears described, are duplicated for each column of figures to be added.

Pivoted within the frame 9—9'—9'' and extending across and underneath the disks (21), is a roller (50). Cut in the surface of the roller (50) are slots (51), one for each column of figures to be added. These slots are spaced to coincide with the position, and number of disks (21). Coiled within the slot (51) is a spring (52), having an angular piece or tooth (27) projecting beyond the circumference of the roller (50), in such a manner that the teeth (27) will engage the beveled notch (26) of the disks (21). The teeth (27) are so placed on the roller (50) that a line drawn from the first tooth to the last tooth, will form a spiral

on the roller (50). The spiral so formed may be one complete turn of the roller (50), or any part of a turn, but never more than one complete turn. The construction is such that only one tooth at a time can engage a disk of the series of disks (21) and as the roller turns the next tooth in the series of teeth (27) engages the next disk of the series of disks (21). The roller (50) is formed with a ratchet gear (53) at one end. It also has a counter sunk compartment (54), in which is a coiled spring (55), so arranged that a forward turning movement of the roller (50) will coil the spring (55). The spring is held by the pawl (56) which is attached to the side 9'' of the frame 9—9'—9''.

Loosely pivoted on the rod (29), is a bar (57), which extends to and rests nominally in contact with the ratchet gear (53), on the roller (50). The stud (58) is set in the side of the bar (57), so that when the key (31) is depressed, the cross arm (30) will engage the stud (58), and lift the bar (57) at the same time the bar (57) engages the stud (59), which is set in the pawl (56), and lifts the pawl (56) away from the ratchet gear (53), and allows the spring (55) to turn the roller back to the starting point. This return movement is limited by the extension piece (56''), which is made a part of the ratchet gear (53), and which engages the stud (59), as the roller turns backward and stops it at the unit or starting point. The forward movement of the roller is accomplished when a key is depressed and the frame 9—9'—9'' swings forward and disengages the arm (57) and the gear (53), allowing the bar (57) to drop down until the stud (58) rests on the arm (30). This places the bar (57) in a slightly lower position, and in line with the next forward tooth, of the ratchet gear (53), so that as the frame 9—9'—9'' swings back into position, the ratchet gear (53) strikes the bar (57) one tooth forward of the first position, and the roller (50) is turned forward one space, coiling the spring (55) and bring the next tooth (27), of the series of teeth on roller (50), into engagement with the next disk of the series of disks (21). It being understood that the spacing of the teeth (27), and the ratchet (53), coincide.

Attached to the casing C is a spring pawl (60), which engages the gear (44), and acts as a stop, preventing any backward movement of the indicator disk (40).

The shaft (41) is provided with a thumb piece (61), outside the casing B, by which the shaft (41) may be turned. The shaft (41) is cut away so as to form a deep and narrow groove (62), around the shaft, within the bearing of each of the indicator disks (40). Within each groove is coiled a light

tension spring (63) which is fastened at one end, to the shaft (41), and with the other end free, so that it presses outward against the bearing of the indicator disk (40). The bearing of each of the indicator disks (40), has a notch (64) cut in it, into which the free end of the spring (63), presses as the disk (40) revolves. The construction being such that the disk (40) revolves forward without interference from the spring (63), but if the shaft (41) is turned forward by the thumb piece (61), the spring (63) will press into the notch (64), and the shaft will carry the disk (40) forward with it. Each spring (63), and notch (64), is set to coincide with the cipher on the disk (40), and one complete turn of the shaft (41), will bring all the disks (40) to register the cipher at the opening (46).

Each of the disks (21), has one tooth of the series of teeth (22), cut away as at 65, so that the disk (21) will move one space without engaging the gear wheel (23). This provides for the cipher when it appears in any number that may be added. The key mechanism hasten keys, one for the cipher and one for the nine numerals. When the cipher appears in any number the cipher key is struck and the adding mechanism is moved, as for any numeral, but because of the absence of the gear tooth as at 65, the registering mechanism is not moved.

It is understood that I use one set of ten keys, one for each numeral, from one to nine, and one for the cipher, and that mounted on the shaft (20) are a series of disks (21), one for each column of figures, that the machine will add. The first disk (21) is for units, the next for tens, the next for hundreds, the next for thousands, the next for ten thousands, etc., to any limit desired. That geared in with each disk are separate indicator disks for registering the units, tens, hundreds, etc., both of the number added and of the total amount added.

The operation of my improved machine is as follows: When any amount is to be added, it is read and recorded on the machine backward, or commencing with the unit column. Thus the amount 903 would be read 3—0—9, and the key struck first would be the three, then the cipher, then the nine. The amount will appear on the indicators of the machine as 903. Assuming that we are to record the number 903, we first depress the key 3, which being one of the smaller numerals, will move a short distance, against the tension of the spring 8, before it reaches the rod (4), it will then depress the frame 1—2—3—4—, against the tension of the spring (5), until the key (3) is stopped by coming in contact with the bar (19). The downward movement of the frame 1—2—3—4— will by means of

the intermeshing gears, (10 and 11) swing the frame 9—9'—9'' on the shaft (20), four parts of its total movement of ten places. The roller (50), mounted on the frame 9—9'—9'' has the units tooth (27), in engagement with the units disk (21), the disk (21) will be moved three points and by means of the gear teeth (22) engaging the gear (23) it will turn the indicator disk (35), so that the figure (3) will appear at the opening (45). The gear (23) will turn the gear (37), and the gear (39). The gear (39) engaging the pawl (42), on the disk (40), will turn the disk (40) three points, so that the figure (3) will appear at the opening (46). While this movement is taking place the spring tooth (25) will engage the beveled teeth (24) of the disk (21), holding the disk and the gears of the indicators in the position they have been moved to by depressing the key (3), so as to register and indicate the amount added. The movement of the frame 9—9'—9'', has moved the ratchet (53) away from the arm (57), so that the arms (57) will drop until the stud (58) rests on the rocking arm (30). It is then in a position to engage the next tooth of ratchet (53). Now if the key (3) is released the spring (5) will lift the frame 1—2—3—4, and with it the frame 9—9'—9'' will swing back into position. The disk (21) and the units indicators (35 and 40) will remain in position registering the number 3. As the frame 9—9'—9'' swings back, the arm (57) will engage the ratchet (53), one tooth in advance of its former position, and will turn the roller (50) a corresponding distance, moving the spring tooth (27) of the units column out of position where it can engage the units disk 21, and bring the next tooth (27) of the series in position to engage the next disk (21), of the series of disks or the tooth and disk corresponding with the tens column. The tens column is here represented by a cipher, and the cipher key is depressed, moving the frame 1—2—3—4, and the frame 9—9'—9'', as previously described. The tooth (27) corresponding with the tens column will now engage the disk (21) corresponding with the tens column and move it one point, but because of the absence of the first tooth, of the series of teeth (22), as shown at 65, the gear (23) will not be moved, and the cipher will remain upon the disks (35 and 40). The ratchet (53) will have moved away from the bar (57) as before explained, so that the bar (57) drops until it rests on the stud (58); and when the key is released and the frame 9—9'—9'' swings back, the bar (57) will engage the ratchet (53), and turn the roller (50) one space bringing the next spring tooth (27) in position to engage the next disk (21), or the tooth and disk

corresponding with the hundreds column. 65 Each time the roller (50) is turned one space or tooth the spring (55) is coiled and held by the pawl (56), engaging the ratchet (53).

The next column of hundreds is represented by nine, and the corresponding key 70 nine, is depressed moving the frame 1—2—3—4, and the frame 9—9'—9'' the full movement of ten spaces, turning the disk (21), and the recording mechanism of the hundreds column, so that the 9 appears 75 at 45, upon the disk (35), and at 46 upon the disk (40). Each of the indicators will now register 903. Having completed the adding of the first number it is necessary to return the mechanism to the unit or starting point. To do this we depress the key 80 (31) which moves the rocking arm (30) and rocks or turns the shaft (29) so that the arm (30) engages the stud (58), and lifts the bar (57), which engages the stud 85 (59), and lifts the pawl (36), releasing the ratchet (53), and the spring (55), so that the roller (50) is turned backward by the spring (55), until the extension piece 56'', of the ratchet (53) engages the stud (59), 90 stopping the roller (50) at the starting or unit position. That is, the first of the series of teeth (27) on the roller (50) will be in a position to engage the first disk of the series of disks, or the disk corresponding with the 95 units column. At the same time the rocking of the shaft (29), moves the series of spring teeth (25) away from the beveled teeth (24), on the series of disks (21), and releasing the disks (21) so that they are 100 turned backward by the springs (28), which were coiled up by the forward movement of the disks (21), before described. This backward movement is stopped by the stud (33), on each disk (21), coming in contact 105 with the extension piece (34) on each of the corresponding spring teeth (25), stopping the disks at the units or starting point. Each disk (21) in turning backward will turn with it the corresponding gear (23), 110 and the indicator disk (35), so that the cipher will appear at the opening (45), on each disk (35). The gears (37 and 39), will turn back with the gear (23), but the indicator disk (40) will remain stationary as 115 the pawl (42) allows the gear (39) to move independent of the disk (40), and the amount 903 will remain on the disk (40) at the opening (46). Any backward movement of the disk (40), is prevented by the 120 spring (60), engaging the gear (44). The spring (60) acting as a lock upon the gear wheels and disk (40). The machine is again in position to add another amount and if we assume the amount to be 468, we will begin 125 by striking the keys for the unit figure eight, then the six and the four. The mechanism will move as before described. The amount

468 will appear at the opening (45), upon the disk (35), thus indicating the amount added, while the total of the addition or 1371 will appear upon the disk (40), at the opening (46). The key (31) is again pressed allowing the roller (50) and the disks (21) to return to the unit or starting position. In like manner I proceed with each amount to be added, always commencing with the unit figure, of each amount. When the sum of the figures added in any column exceeds ten, the gears (43 and 44) turning together brings the one tooth in ten of the gear (44'); to engage the gear (44) of the next higher column, and turn it one space. When the addition has been completed and it is desired to begin a new one, the indicator disks (40) are brought to the cipher, by turning the finger piece (61), which turns the shaft (41), so that the spring (63) on the shaft (41) will engage the notches (64) in the bearings of the disks (40), and turn the disks with the shaft. One complete turn of the finger piece (61) will engage all of the disks and bring them all to the cipher.

The locking mechanism operates as follows: When a key is depressed, and the frame 9-9'-9'' swings one or more spaces forward, the beveled edge 9' releases the series of bars (12), which drop of their own weight, so that the hook (15) on each bar engages the hook (18) on each key and locks the key. There are ten bars such as (12), one for each key, so that each key is locked separately. When the frame 9-9'-9'', swings back, the beveled edge 9' engages the V-shaped ends (14) of the series of bars (12) and lifts the hooks (15) from the hooks (18) releasing each key. Should any key be depressed before the oscillation of the frame 9-9'-9'' releases the hooks, the pressure of the finger on the key comes directly on bar (12), and the shaft (13), making it impossible to depress the key and impossible for the operator to work faster than the machine.

I claim:—

1. In an apparatus of the kind described, a combination of a suitable frame work for the machine, a key frame pivoted in said frame work, and adapted to oscillate on its pivot, a series of key levers and one or more suitable stops, adapted to oscillate the frame a series of graduated distances; a separate tension spring for each key lever; a finger piece in each key lever; a spring, adapted to cooperate with the key lever in oscillating the key frame; a shaft; a frame journaled on said shaft, adapted to oscillate thereon; intermeshing gears between the key frame and the oscillating frame, adapting them to oscillate in unison; a beveled edge on the oscillating frame and one or more

V-shaped stops, adapted to engage said beveled edge and hold the oscillating frame and key frame against the tension of the spring, as specified herein.

2. In an apparatus of the kind described the combination of a suitable frame work for the machine; a key frame pivoted in said frame work, and adapted to oscillate on its pivot; a series of key levers and one or more suitable stops, adapted to oscillate the key frame a series of graduated distances; a separate tension spring for each key lever; a finger piece for each key lever; a spring, adapted to cooperate with the key levers in oscillating the key frame; one or more of said key levers having a notch to allow the lever to be moved a short distance before it engages and moves the key frame, as described herein.

3. In an apparatus of the kind described, the combination of a suitable frame for the machine; a key frame pivoted in the frame of the machine, adapted to oscillate on its pivot; a series of key levers and one or more suitable stops, adapted to oscillate the frame a series of graduated distances; a spring, adapted to cooperate with the key levers in oscillating the key frame; a shaft; a frame journaled on said shaft, adapted to oscillate thereon; intermeshing gears between the key frame and the oscillating frame, adapting them to oscillate in unison; an extension or arm formed on each key lever; a hook on each of said arms; a series of tilting levers pivoted in the frame of the machine; a hook on one end of each tilting lever, adapted to engage the hook on a key lever and lock it in place; a V-shaped notch on the opposite end of each tilting lever; a beveled edge on the oscillating frame, adapted to engage the V-shaped notch on each tilting lever; said tilting levers forming a stop, to limit the action of the spring in oscillating the key frame, and a means to lock and unlock the key levers, as described herein.

4. In an apparatus of the kind described, the combination of a suitable frame for the machine, a shaft; a frame, journaled on said shaft, adapted to oscillate thereon; a key mechanism and a spring adapted to oscillate said frame a series of graduated distances; a toothed roller, journaled in the frame; a ratchet on said roller; a rocking shaft; a bar, pivoted on said rocking shaft, engaging the ratchet, adapted to turn the roller by the ratchet striking the bar as the frame oscillates; substantially as described herein.

5. In an apparatus of the kind described, the combination of a suitable frame for the machine; a shaft; a frame, journaled on said shaft, adapted to oscillate thereon; a key mechanism and a spring, adapted to oscillate the frame a series of graduated distances; a toothed roller, journaled in the frame; a

ratchet on said roller; a coiled spring, adapted to be coiled by turning the roller and to turn the roller backward when released; a pawl to hold the coiled spring; a rocking shaft; a bar, pivoted on said rocking shaft, engaging the ratchet, adapted to turn the roller, and coil the spring element, by the ratchet striking the bar as the frame oscillates; a cross arm on said rocking shaft; a key on the cross arm adapted to rock the shaft; means for engagement between the cross arm and the bar; means for engagement between the bar and the pawl, adapted to disengage the bar and pawl from the ratchet, to release the coiled spring; an extension piece on the ratchet and a stud on the pawl, adapted to engage each other and limit the return movement of the roller to the unit or starting point; and a spring on the pawl adapted to throw the pawl and bar back in position; substantially as described herein.

6. In an apparatus of the kind described, the combination of a suitable frame for the machine; a shaft; a frame journaled on the shaft, adapted to oscillate thereon; a key mechanism and a spring adapted to oscillate said frame a series of graduated distances; a series of disks mounted on the shaft within the frame, adapted to be turned on the shaft by the oscillating frame; a roller journaled in the frame, extending across the disks; a series of teeth on the roller, spaced to correspond with the series of disks; a notch formed in each disk to receive the tooth; said teeth set in a spiral line on the roller, adapting each tooth to engage the corresponding disk as the roller is turned, and means for turning the roller the space of one tooth at each oscillation of the frame substantially as described herein.

7. In an apparatus of the kind described, the combination of a suitable frame for the machine; a shaft; a frame journaled on the shaft, adapted to oscillate thereon; a key mechanism and a spring adapted to oscillate said frame a series of graduated distances; a series of disks, mounted on the shaft, adapted to turn thereon; a coiled spring for each disk, adapted to be coiled by turning the disk, and to turn the disk backward when released; a series of beveled teeth on each disk; a rocking shaft; a series of spring teeth on the rocking shaft, adapted to engage the beveled teeth and hold each disk against the tension of the spring element; said rocking shaft adapted to disengage the spring teeth and release the spring element; a stud on each disk, an extension piece on each spring tooth, adapted to engage each other and limit the return movement of the disk to the unit or starting point; and a means for turning each disk of the series in succession as the frame oscillates; substantially as described herein.

8. In an apparatus of the kind described, the combination of a suitable frame for the machine; a shaft; a frame mounted on said shaft adapted to oscillate thereon; a series of keys and a spring, adapted to oscillate the frame a series of graduated distances; an equal number of lock elements, operated by the oscillating frame, adapted to lock and unlock said keys; a series of disks mounted on the shaft, adapted to turn thereon; a roller journaled in the frame extending across the disks; a spiral line of teeth on the roller, adapted to engage the disks; a notch in each disk to receive one of the teeth; a ratchet on the roller; a bar, adapted to strike the ratchet and turn the roller the space of one tooth at each oscillation of the frame; a coiled spring for the roller and for each disk, adapted to reverse said roller and disk; a lock element for each coiled spring; a rocking shaft, adapted to engage the lock elements and release the coiled springs; means to limit the reverse movement of the roller and disks to the cipher or starting point; a series of indicators mounted on a shaft; intermeshing gears between each disk and one of the indicators, adapting the indicator to register the backward and forward movement of each disk; a second series of indicators and intermeshing gears, adapted to register the total forward movement of all the disks; and means for bringing the second series of indicators to the cipher when desired; substantially as described herein.

9. In an apparatus of the kind described, the combination of a suitable frame for the machine; a shaft; a frame, journaled on said shaft, adapted to oscillate thereon; a key mechanism and a spring, adapted to oscillate said frame a series of graduated distances; a series of disks mounted on said shaft, adapted to turn thereon; means for turning each disk in succession by oscillating the frame; means for locking each disk in position; means for reversing said disks to the cipher; a series of gear teeth on each disk; a series of indicators mounted on a shaft; intermeshing gears between each disk and an indicator, adapting the indicator to register the disk movement; a blank space cut from the gear teeth of each disk, adapting the disk to move one space before engaging the gear of the indicator; a second series of indicators loosely mounted on a shaft; a gear wheel loosely mounted for each indicator; a pawl on the indicator to engage said gear wheel; intermeshing gears between said gear wheel and the gear of the first series of indicators, adapting the second series of indicators to move forward with the first series but not backward; intermeshing gears adapting the second series of indicators to register the total forward move-

ment of all the disks; a pawl to prevent the backward movement of each of the second series of indicators; and a means for bringing said indicators to the cipher when desired; substantially as described herein.

10. In an apparatus of the kind described, the combination of a suitable frame work for the machine; a shaft, mounted in said frame work; a frame journaled on the shaft, adapted to oscillate thereon; a key mechanism, and a spring, adapted to oscillate the frame a series of graduated distances; a series of disks loosely mounted on the shaft, adapted to be turned by the oscillating frame; a toothed roller engagement between the disks and the oscillating frame; means to turn the roller at each oscillation of the frame, adapted to shift the engagement between the disks and the frame, to each disk of the series in succession; a series of indicators, adapted to register the movement of each disk; a series of indicators, adapted to register the total movement of the series of disks; a means for locking the disks and indicators, when moved by the oscillating frame; and a means for reversing the disks and indicators, and the roller mechanism of the oscillating frame to the cipher or starting point, as described herein.

11. In an apparatus of the kind described, the combination of a shaft; a series of disks mounted on said shaft and adapted to be turned forward and backward thereon; a series of indicators; intermeshing gears, adapting each disk to turn an indicator and register the backward and forward movement; a second series of indicators; intermeshing gears, adapted to turn the second series of indicators forward with each disk, but not to turn backward, and to register the total forward movement of each disk; intermeshing gears between the members of the second series of indicators, adapting said indicators to record the total movement of all the disks; means for bringing

all of the second series of indicators to the cipher when desired; a key mechanism, adapted to turn each disk of the series in succession, any one of a series of graduated distances; and means for bringing said series of disks and indicators to the cipher or starting point, as described herein.

12. In an apparatus of the kind described, the combination of a shaft; a series of disks mounted on said shaft and adapted to turn forward and backward thereon; a key mechanism adapted to turn each disk in succession, one of a series of graduated distances; a series of indicators; intermeshing gears, adapting each disk to turn an indicator and record the backward and forward movement; means of allowing the disk to move the first of the series of graduated distances without turning the indicator; and means for bringing the disk and indicator to the cipher or starting point as described herein.

13. In an apparatus of the kind described, a shaft; a series of disks mounted on said shaft, adapted to turn thereon; an oscillating frame common to all the disks, mounted on said shaft, adapted to oscillate thereon; a key mechanism and a spring, adapted to oscillate the frame a series of graduated distances; a locking mechanism between the oscillating frame and the first of the series of disks, adapting the frame to turn the disk; means for shifting the locking mechanism to each disk of the series in succession, as the frame oscillates; means for indicating and registering the movement of the series of disks; and means for bringing said disks, indicators and the locking mechanism to the cipher or starting point, as described herein.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 28th day of April, 1909.

JOHN A. TOOMEY.

In presence of—

CAROLINE L. TOOMEY,
ELIZABETH A. NEAL.