UNITED STATES PATENT OFFICE.

OLIVER D. JOHANTGEN, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE VICTOR ADDING MACHINE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

ADDING-MACHINE.

1,306,112. Specification of Letters Patent. Patented June 10, 1919.

Application filed May 16, 1917. Serial No. 168,932.

To all whom it may concern:

Be it known that I, OLIVER D. JOHANTGEN, a citizen of the United States, and resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Adding-Machines, of which the following is a specification, and which are illustrated in the accompanying drawings, forming a part thereof.

The invention relates to calculating machines and has special reference to the construction of the accumulator. More specifically, the invention relates to machines of that type or class wherein the operation of carrying the units of next higher denomination to the corresponding columns is accomplished by spring actuated transfer devices which are separate from the main actuating elements.

The principal object of the invention is to insure certainty in the operation of the transfer devices under all circumstances without any requirement for obtaining extreme nicety in the construction of the parts or for using any appliance to limit the speed at which the operations of the machine may be repeated. The invention accordingly contemplates a construction in which the transfer devices are restored for tensioning their springs during the movement of the indicator wheels by the main actuating elements. The carrying operation is thus allowed to begin immediately upon the disengagement of the indicator wheels from the main actuating elements and is not required to be completed until the reëngagement of these parts during the next operation of the machine. A sufficient interval for the completion of the carrying operation is thereby always provided even when the "carrying" is to be transmitted through a plurality of columns and the actuation of the machine is immediately repeated for the purpose of performing a second addition of the same number.

A further object of the invention is to permit the use of relatively strong springs for actuating the transfer devices while still permitting of an easy release of each transfer device when the carrying operation is to be transmitted from the column of next lower denomination. For this purpose the invention contemplates the use of a pivoted transfer member with the latch which normally holds the transfer member against operation located at a much greater distance from the pivot or fulcrum of the transfer member than is the point of attachment thereto of the actuating spring or the point of engagement of the transfer member with the corresponding indicator. Another object of the invention is to provide a construction having parts which may be readily assembled and, in this connection, to permit the parts of the accumulator to be assembled separately from other parts of the machine.

The invention is exemplified in the machine which is hereinafter described and which is illustrated in the accompanying drawings, wherein—

Figure 1 is an elevation showing that side of the machine at which the actuating handle is located in service, but with said handle and the case or cover removed to disclose parts which would be concealed thereby,

Fig. 2 is an elevation showing the side of the machine remote from the actuating handle and with some parts broken away,

Fig. 3 is a central longitudinal sectional view, with some parts omitted,

Fig. 4 is a detail plan view showing the accumulator with some parts broken away,

Fig. 5 is a front elevation,

Fig. 6 is a rear elevation of the accumulator, the actuating elements being shown in section,

Figs. 7, 8 and 9 are each similar to a detail of Fig. 3, but show the parts of the accumulator in different positions,

Fig. 10 is a detail side view showing some of the individual parts of the machine in elevation and showing other parts in section, the plane of the section being indicated by the line 10—10 on Fig. 6, and

Fig. 11 is similar to Fig. 10, but shows the corresponding parts in a different position.

The drawings illustrate an adding machine having seven indicator wheels represented at 25 to 31, inclusive. These indicator wheels are formed as usual with a ten tooth gear 32 upon one side and with a cam 33 upon the other side. The cam 33 has the customary abrupt rearward face 34 for limiting the rotation of the corresponding indicator wheel in one direction and thereby determining its zero position. All of the indicator wheels 25 to 31 inclusive are rotatably mounted upon a common spindle 35. This spindle is held in a rocking frame which is generally designated 36 and which is hereinafter referred to as the accumula-

tor frame. The accumulator frame 36 includes two end plates 37 and 38 and a tie plate 39. The two end plates 37 and 38 are located at opposite sides of the machine and each of these plates is engaged with the spindle 35 near one end of the same. The tie plate 39 extends across the front of the machine and rigidly connects the two end plates 37 and 38.

The accumulator frame 36 swings upon a transverse shaft 40 as a pivot. This shaft also has a swinging movement, being part of a second rocking frame generally designated 135. As shown, the two ends of the shaft 40 are mounted in bell-crank arms 41 and 42, one at each side of the machine. Each of the bell-crank arms 41 and 42 swings upon a fixed stud 43. These studs are located in axial alinement and constitute pivots for the rocking frame 135. The two bell-crank arms 41 and 42 are firmly connected by the transverse shaft 40 and they rotatably receive the two ends of a rock shaft 44. A third frame, generally designated 136, serves for guiding the relative movement of the shaft 44 and spindle 35. This frame comprises a front plate 137, which extends across the front of the machine, and a pair of rearwardly extending end plates 138 and 139. The end plates 138 and 139 are pivoted on the tie rod 44 and slidingly engage the spindle 35. As shown, each end plate 138, 139, is formed with a slot 140 for slidingly receiving the spindle 35 (Fig. 10). Each end plate 138 and 139 is preferably also formed with a depending hooked arm 141.

The two studs 43 which constitute the pivots for the rocking frame 135 are fixed in the upturned ends 45 and 46 respectively of a stationary U-shaped bracket. This bracket is generally designated 47 and is hereinafter referred to as the accumulator bracket. The ends 45 and 46 of the bracket 47 have vertical slots, one of which is shown at 48 (Fig. 1). These slots slidingly receive the ends of the spindle 35 for guiding the movement of the accumulator frame 36. Vertical movement of the spindle 35 in the said slots, as 48, serves to move the gears 32 of the indicator wheels, 25 to 31, inclusive, into and out of position for engagement with the actuating rack bars, as 51.

A spring 49 (shown in Figs. 2, 4, 5 and 6) acts between one of the bell-crank arms as 42 and a lug 50 on the corresponding end 46 of the accumulator bracket 47 for swinging the rocking frame 135 inwardly. This inward movement of the frame 135, by raising the transverse shaft 40, serves to swing the accumulator frame 36 for raising the spindle 35 in the vertical guide slots, as 48, of the bracket 47. The spring 49 is accordingly relied upon to lift the gears 32 out of the path of the said rack bars, as 51. Furthermore, as the movement of the spindle 35 is confined by the vertical guide slots 48 (Fig. 1), the rock shaft 44 approaches the spindle 35 during the upward movement of the latter. Similarly, as the spindle 35 descends, the shaft 44 moves forwardly away from it. The movement of the indicator wheel gears 32 into and out of engagement with the rack bars 51 is accordingly accompanied by a relative separation and approach of the rock shaft 44 and spindle 35. This relative movement of the rock shaft 44 and spindle 35 is permitted by the sliding engagement of the end plates 138, 139, of the frame 136 with the spindle 35 (Fig. 10).

The main frame of the machine comprises the two main side plates 52 and 53 and four transverse tie plates 54, 55, 56 and 57. When the parts are assembled in the manner described, the accumulator bracket 47 is detachably secured in place, as by screws 58 which unite the two ends 45 and 46 of the bracket with the corresponding main side plates 52 and 53. The rack bars, as 51, are slidingly supported upon the two lower tie plates 54 and 55.

The forward movement of each rack bar, as 51, is accomplished in the usual manner by a separate spring, as 59, (Fig. 3). The return movement of all of the rack bars is accomplished by a common transverse rod 60. This rod extends entirely through the machine and is slidingly supported near its opposite ends in slotted openings 61 of the main side plates 52 and 53. The rod 60 also extends through a slotted opening 62 in each of the rack bars, as 51. The two ends of the rod 60 project beyond the corresponding main side plates 52 and 53 and each end of the rod is supplied with a roller 63.

The rollers 63 are engaged with slotted openings 64 of the crank arms 65, one at each side of the machine. Each crank arm 65 has a second slotted opening 66 at its lower end. This last mentioned opening is made flaring and receives a roller 67 which is carried by the corresponding main crank 68. By reason of the flaring shape of the openings 66 there is a limited amount of lost motion between the main cranks 68 and the crank arms 65. The main cranks 68 are fixed upon the main shaft 69 to which the actuating handle (not shown) is applied. As is usual in calculating machines, the actuating handle is employed for swinging the main cranks in one direction only. The return movement of these cranks is accomplished by the main spring 86.

In the normal operation of the machine the forward movement of the rack bars, as 51, is controlled by the depression of keys 70, there being a separate set of nine keys for each rack bar, and each rack bar being provided with a series of shoulders, as 142, for engagement with the key stems. The lock for the keys of one of the said sets is repre-

sented at 71. This lock is slidingly supported at its opposite ends in the two upper tie plates 56 and 57. Each lock 71 has a plurality of laterally projecting beveled studs 82 for engagement with the notched stems of the several keys 70. It is also formed with a laterally projecting stud 83 for engagement with a bell-crank lever 84 to which the corresponding rack bar stop 85 is connected.

The total and repeat keys 75 and 79 are located at opposite sides of the machine. The key release bar 72 extends transversely through the machine adjacent these keys. This key release bar 72 is carried by a rock shaft 73 which also extends transversely through the machine. One end of the bar 72 is turned forwardly to provide a striker 74 for engagement by the stem of the total key 75 (Fig. 1). The other end of the release bar 72 is formed into a crank 76 for connection with the key throw-out lever 77. One end of the key throw-out lever 77 is normally fulcrumed against an abutment shoulder 78 on the stem of the repeat key 79. The other end of the lever 77 carries a roller 80 for engagement with the key throw-out cam 81. When the repeat key 79 is depressed the abutment shoulder 78 is moved out of the path of the upper end of the lever 77 and the swinging of the lever 77 by the key throw-out cam 81 is ineffective to move the key release bar 72.

In the normal operation of the machine, the depression of the accumulator frame 36 for the engagement of the indicator wheel gears 32 with the rack bars, as 51, occurs during the inward or return movement of the rack bars. For cleaning the machine, the depression of the accumulator frame 36 occurs during the outward movement of the rack bars. These depressions of the accumulator frame 36 are accomplished by cams 87 and 88 respectively, (Fig. 2).

As shown, the cams 87 and 88 are mounted on the same shaft 89 with the key throw-out cam 81, but at the remote side of the machine from the last mentioned cam. The shaft 89 also carries a double-wing cam 90 and a ratchet disk 91. These are located at the same side of the machine with the key throw-out cam 81 (Fig. 1). The ratchet disk 91 coöperates with a spring pawl 92 for preventing counter rotation of the shaft 89. This disk also carries a wrist pin 93 and a jointed link 94 connects the wrist pin 93 with the corresponding main crank 68. The double-wing cam 90 is provided for turning the shaft 89 when the wrist pin 93 is so positioned that the link 94 is ineffective. As shown, this cam is engaged by a roller 95 and the roller 95 is carried by a swinging arm 96 which is pivotally supported upon the same stud, as 97, with the pawl 92. A stout spring 98 serves for swinging the arm 96 to urge the roller 95 along the inclined surfaces 99 and 100 of the cam 90 for turning the shaft 89 when the link 94 is at the ends of the stroke.

Two levers 101 and 102 are provided for coöperating with the cams 87 and 88 respectively. As shown, both of the levers 101 and 102 are pivotally mounted upon the same stud, as 103. Each lever is provided with a roller, as 104 and 105, and separate springs, 106 and 107, are connected with the levers 101 and 102, respectively, for holding the rollers 104 and 105 against the corresponding cams.

The movement of one or the other of the levers 101, 102, is communicated to the rocking frame 135, depending upon whether the machine is operated for addition or for clearing the indicator wheels 25 to 31 inclusive. For this purpose a link 108 extends rearwardly from the rock shaft 44 to a point adjacent the rollers 104 and 105. At its rear end, this link is formed with two laterally offset and vertically separated shoulders 109 and 110 for selective engagement with the studs, as 111, by which the rollers 104 and 105 are connected with the corresponding levers 101, 102. When the parts occupy the position illustrated in Fig. 2, the link 108 is actuated by the engagement of its shoulder 109 with the stud 111 upon the lever 101. Under these circumstances the movement of the lever 102 by the cam 88 is idle. There is accordingly no movement of the link 108 until the cam shaft 89 has been turned through substantially one hundred and eighty degrees from the position illustrated in Fig. 2. The movement of the link 108 then serves to depress the accumulator frame 36 for the engagement of the gears 32 with the rack bars, as 51, during the inward movement of the said rack bars.

When the indicator wheels are to be cleared, the rear end of the link 108 is shifted for the engagement of the shoulder 110 with the stud 111 on the lever 102. This shifting of the link 108 is accomplished by depressing the total key 75. As shown, the lower end of the total key 75 is formed with a notch 112 which receives a horizontal portion 113 of the link 108. As provision should be made for preventing the shifting of the link 108 except when the parts are in the position of rest, the total key 75 is desirably locked against movement during the operation of the machine. A lock for this purpose may be provided by forming an instanding annular flange 114 on the cam 88. This flange has a single opening at one side, as at 115.

The other part of the lock for holding the total key 75 against movement consists of a lever 116. This lever is pivotally secured against the side plate 53 at 117 and one end of the lever is formed with a lateral projec-

tion 118 which registers with the opening 115 of the flange 114 when the cam shaft 89 is at rest. At other times, the flange 114 serves to prevent the swinging of the lever 116, whether the part 118 is above or below the said flange. As the lever 116 is connected with the stem of the total key 75, the flange 114 serves to prevent movement of the total key 75 in either direction, during the rotation of the shaft 89. A spring 119 is connected with the lever 116 for normally holding the total key 75 in elevated position. It follows that whenever the indicator wheels, 25 to 31 inclusive, are to be cleared, the operator must hold the total key 75 in depressed position until the shaft 89 has been set in motion. If the total key 75 is not so held in depressed position, its use merely serves to clear the key board by the engagement of the stem of the total key with the striker 74.

A pivoted transfer member 120 is associated with each of the indicator wheels, 25 to 31 inclusive, except the one of lowest denomination. These transfer members are fulcrumed upon the shaft 44 and each is formed with a gear segment 127. The relative approach and separation of the tie rod 44 and spindle 35 accordingly serve to move the gear segment 127 of each transfer member 120 into and out of mesh with the gear 32 of the corresponding indicator wheel. As the shaft 44 moves forwardly away from the spindle 35 during the descent of the spindle, and rearwardly toward the spindle when the latter is elevated, each rack bar, as 51, and gear segment 127 are engaged with the corresponding gear 32 in alternation. One of the functions of the gear segments 127 is therefore to prevent accidental turning of the indicator wheels 26 to 31 inclusive when the gears 32 are disengaged from the rack bars, as 51. As there is no gear segment 127 for engagement with the gear 32 of the indicator wheel of lowest denomination, the adjacent end plate 138 of the frame 136 is provided with a single gear tooth 143 (Fig. 10) for controlling this indicator wheel. The tooth 143 moves into and out of engagement with the gear 32 of the indicator wheel 25, as the shaft 44 approaches and recedes from the spindle 35.

Each transfer member 120 preferably has its rear end portion folded to provide a pair of laterally separated parts 121 and 122 for pivotal engagement with the tie rod 44. The forward portion 123 of each transfer member extends inwardly under the spindle 35 in the form of a hook, most clearly shown in Fig. 7. Each transfer member 120 also includes a depending leg or striker 124. The striker 124 is located a short distance in front of the plane of the shaft 44 and the transfer springs, as 125, are each connected with the corresponding transfer member 120 adjacent the upper end of the striker 124. These springs extend downwardly and forwardly and each spring has its lower end connected with a lug 126 on the front cross-piece 39 of the accumulator frame 36.

As is most clearly shown in Figs. 4 and 5, the transfer members 120 are so positioned on the tie rod 44 that each transfer member extends between two adjacent indicator wheels, 26 to 31 inclusive. Under these circumstances, the gear segments 127 and hooked portions 123 are respectively formed upon the two laterally separated parts 121 and 122 of the transfer members. To prevent lateral displacement of the transfer members 120 on the tie rod 44, the front cross piece 137 of the frame 136 is provided with a series of inturned fingers 144. Each two adjacent fingers 144 engage one of the transfer members 120 upon opposite sides of the same. The operation of the transfer members 120 is controlled by latches, as 129. As shown, the latches 129 are strung upon a tie rod 130 which connects the two end plates 37 and 38 of the accumulator frame 36, at their upper ends. These latches accordingly hang between the indicator wheels, 25 to 31 inclusive, in rear of the spindle 35. Each latch 129 is formed with a transverse shoulder 131 and it is this shoulder which is engaged by the abrupt face 34 of the cam 33 for limiting the counter rotation of the indicator wheel next to the right, as viewed in Fig. 4. The transverse shoulder 131 of each latch 129 also cooperates with the hooked inner end 123 of the corresponding transfer member 120. As no latch is required beyond the indicator wheel of highest denomination, an arm 145 (Fig. 6) hangs from the tie rod 130 near one end of the same. This arm has a transverse shoulder 146 which coöperates with the abrupt face 34 of the cam 33 on the indicator wheel 31 to limit the counter rotation of this indicator wheel.

A pawl 132 is provided for holding each of the latches 129 in adjusted position. As shown, these pawls are strung upon the spindle 35 between the indicator wheels, 25 to 31 inclusive, where they serve as spacers for positioning these wheels along the spindle. Each pawl 132 has a pair of contact shoulders 133 and 134 for engagement with the transverse shoulder 131 of the corresponding latch 129. These shoulders 133 and 134 are located at different distances in rear of the spindle 35. When any one of the latches 129 is engaged with the shoulder 133 of the corresponding pawl 132, the latch is held out of the path of the hooked end 123 of the corresponding transfer member 120. When any one of the latches 129 is engaged with the shoulder 134 of the corresponding pawl 132, on the other hand, the transverse shoulder 131 of the latch will be positioned for en-

gagement with the hooked end 123 of the corresponding transfer member. A spring 147 reacts between each latch 129 and its pawl 132 for controlling the relative movement of these parts.

Each cam 33, except the one on the indicator wheel of highest denomination, serves for positioning one of the latches 129 for engagement with the shoulder 133 of its pawl 132 whenever the corresponding indicator wheel has been turned through ten units or more. The transverse shoulder 131 of the latch is thus held out of the path of the hooked end 123 of the corresponding transfer member 120 and the said transfer member is permitted to descend. In order that the latch 129 may not remain in this position and thereby permit the corresponding transfer member 120 to descend at each subsequent operation of the machine, provision is made for tilting the pawl 132 when the transfer member approaches the limit of its downward movement. As shown, each transfer member 120 is formed with a cam lip 128 (Fig. 8) for engaging the pawl 132 of the corresponding latch 129.

When the shaft 44 occupies its forward position, as in Fig. 8, the paths of the hooked ends 123 of the transfer members 120 do not extend to the latches 129, whether the latches 129 are engaged with the shoulders 133 or 134 of the pawls 132. The separation of the shaft 44 and spindle 35 upon the descent of the accumulator frame 36 accordingly permits of the transfer members 120 being raised for tensioning their springs 125 while the indicator wheel gears 32 are engaged with the rack bars, as 51.

A rod 148, having a swinging movement, extends transversely in front of all of the depending legs 124 of the transfer members 120 for raising these members. The rod 148 constitutes the lower cross piece of a rocking frame which swings upon the shaft 44 as an axis. The two ends of this frame are designated 149 and 150 respectively. One of these parts is formed with a beveled projection 151 (Figs. 10 and 11) for engagement with the hooked end of an actuating link 152. Movement of the rod 148 in one direction is limited by the depending arms 141 of the end plates 138 and 139 of the frame 136. For this purpose the hooked lower ends of the arms 141 extend in front of the rod 148.

The actuating link 152 (Figs. 10 and 11) has a pin and slot connection 153, 154, with one of the main cranks 68. A spring 155 also extends between the link 152 and the adjacent main crank 68 for controlling the link. The spring 155 acts to raise the forward end of the link 152. This upward movement of the link is limited by a guide lug 156 which is formed on the adjacent end 45 of the accumulator bracket 47 (Fig. 1). At all times, except when the transfer members 120 are retained by the corresponding latches 129, the strikers 124 are held in contact with the rod 148 by the transfer springs 125 (Figs. 7 and 9).

When the main shaft 69 is turned forwardly, the hooked end of the link 152 is projected forwardly under the lower end of the arm 149 for engagement with the beveled projection 151 (Fig. 10). As the main cranks 68 reach the limit of their forward movement the cam 87 rocks the frames 36 and 135 for disengaging the indicator wheel gears 32 from the gear segments 127 and engaging them with the rack bars 51. The transfer members 120 may accordingly be restored and, owing to the forward movement of the shaft 44, away from the accumulator frame 36, the path of movement of the hooked inner ends 123 of the transfer members 120 is in front of the latches 129. During the initial rearward movement of the main cranks 68, the rod 148 is moved rearwardly and upwardly and the transfer members 120 are brought to the position illustrated in Fig. 8. The frames 36 and 135 are now rocked to raise the indicator wheel gears 32 out of mesh with the rack bars, as 51, and bring them into engagement with the gear segments 127, the engagement of the gear segments 127 with the accumulator wheel gears 32 being accomplished by an inward movement of the shaft 44. The inward movement of this shaft also serves to move the transfer members 120 inwardly to a position in which their hooked inner ends 123 extend over the transverse shoulders 131 of the latches 129, provided these shoulders are engaged with the shoulders 134 on the pawls 132. The rod 148 is then released by the disengagement of the hooked end of the link 152 from the beveled projection 151 on the arm 149. All of the transfer members 120 which are not caught by the latches 129 are accordingly drawn down by the transfer springs 125 for performing the corresponding carrying operations. Should the carrying operation move the indicator wheel of any denomination from nine to zero, the corresponding cam 33 will release the latch 129 from the next adjacent transfer member 120. The said next adjacent transfer member will now be drawn down by its spring 125 for transmitting the carrying operation to the indicator wheel of next higher denomination. In some instances, as when a number of the indicator wheels have been moved to "nine" by the rack bars, as 51, this operation may be repeated through several columns. As the gear segments 127 remain in engagement with the indicator wheel gears 32 until the end of the next forward stroke of the main cranks 68, there is ample time for these carrying operations to be completed, even though the actuation of the machine may be immediately repeated.

In transmitting the carrying operation from column to column, each cam 33 is actuated by one transfer spring 125 for releasing a latch 129 from a part which is held against the said latch by a similar transfer spring. Nevertheless, ample power for this purpose is obtained through the connection of each transfer spring 125 with the transfer member 120 at a point which is much closer to the axis of pivotal movement of the transfer members than is the point of engagement of the hooked end 123 of the transfer member with the corresponding latch 129. It is also noted that the radius of each gear segment 127 is much less than the distance from the axis of the pivotal movement of the transfer members 120 to the point of engagement of the hooked end 123 of each transfer member with the corresponding latch 129. This arrangement permits of the use of relatively strong transfer springs 125 without danger of the latches 129 being so firmly engaged with the hooked ends 123 of the corresponding transfer members 120 that they will not be released by the engagement therewith of the cams 33. A further important feature of the construction is the arrangement by which the transfer members 120 are restored when their path of movement does not extend to the latches 129. Under these circumstances the restoration of the transfer members 120 does not interfere with the setting of the latches 129 by the cams 33 during the turning of the indicator wheels by the rack bars, as 51. The restoration of the transfer members 120 during the inward movement of the rack bars, as 51, is accordingly permitted. While some novel features of construction within the main frame are illustrated in the drawings, these features are not claimed herein but are reserved for a separate application.

The pin and slot connection 153, 154, of the link 152 with the corresponding main crank 68 permits the spring 155 to move the link 152 rearwardly in advance of the rearward movement of the said crank 68 to hold the transfer members 120 in elevated position during the rearward movement of the shaft 44. That is to say, the contraction of the spring 155 and the construction which permits a limited amount of inward movement of the link 152 in advance of the corresponding crank 68, prevents any sagging of the transfer members 120 during the inward movement of the shaft 44.

I claim as my invention:

1. In an adding machine, in combination, a pair of register wheels, a spring actuated transfer member for turning the wheel of higher denomination, means for turning the wheel of lower denomination and for setting the transfer member, a movable lock for holding the transfer member in set position, a cam carried by the register wheel of lower denomination for moving the lock to inoperative position, a pawl for holding the lock in the position to which it is moved by the cam and means operated by the transfer member when it is moved by its spring for lifting the pawl to release the lock.

2. In an adding machine, in combination, three parallel spindles, a pair of register wheels mounted on the intermediate spindle, a spring actuated transfer member for turning the register wheel of higher denomination pivotally mounted on one of the other spindles, means for turning the register wheel of lower denomination and for setting the transfer member, a lock for holding the transfer member in set position pivotally mounted on the third spindle, a cam carried by the register wheel of lower denomination for moving the lock to inoperative position, and a pawl pivotally mounted on the intermediate spindle for holding the lock in the position to which it is moved by the cam, a part of the pawl extending into the path of movement of the transfer member.

3. In an adding machine, in combination, a pair of register wheels, a spring actuated transfer member for turning the wheel of higher denomination, means for turning the wheel of lower denomination and for setting the transfer member, a movable lock for holding the transfer member in set position, a cam carried by the register wheel of lower denomination for moving the lock to inoperative position, and a pawl for holding the lock in the position to which it is moved by the cam, a part of the pawl extending into the path of movement of the transfer member.

4. In an adding machine, in combination, three parallel spindles, two adjacent spindles being held against relative movement and the third spindle being movable toward and away from the other two, a pair of register wheels mounted on the intermediate spindle, a gear fixed to the register wheel of higher denomination, a spring actuated transfer member pivotally mounted on the said movable spindle, a gear segment formed on the transfer member for engaging the said gear when the said movable spindle has been moved toward the other spindles, means for turning the register wheel of lower denomination, for moving the movable spindle and for setting the transfer member when the movable spindle is remote from the other two, a lock pivotally mounted on the outer one of the two first separately mentioned spindles for holding the transfer member in set position when the movable spindle has been moved toward the other spindles, and a cam carried by the register wheel of lower denomination for moving the lock to inoperative position.

5. In an adding machine, in combination,

three parallel spindles, two adjacent spindles being held against relative movement and the third spindle being movable toward and away from the other two, a pair of register wheels mounted on the intermediate spindle, a gear fixed to the register wheel of higher denomination, a spring actuated transfer member pivotally mounted on the said movable spindle, a gear segment formed on the transfer member for engaging the said gear when the said movable spindle has been moved toward the other spindles, means for turning the register wheel of lower denomination, for moving the movable spindle and for setting the transfer member when the movable spindle is remote from the other two, a lock pivotally mounted on the other one of the two first separately mentioned spindles for holding the transfer member in set position when the movable spindle has been moved toward the other spindles, a cam carried by the register wheel of lower denomination for moving the lock to inoperative position, and a pawl for holding the lock in the position to which it is moved by the cam.

6. In an adding machine, in combination, three parallel spindles, two adjacent spindles being held against relative movement and the third spindle being movable toward and away from the other two, a pair of register wheels mounted on the intermediate spindle, a gear fixed to the register wheel of higher denomination, a spring actuated transfer member pivotally mounted on the said movable spindle, a gear segment formed on the transfer member for engaging the said gear when the said movable spindle has been moved toward the other spindles, means for turning the register wheel of lower denomination, for moving the movable spindle and for setting the transfer member when the movable spindle is remote from the other two, a lock pivotally mounted on the outer one of the two first separately mentioned spindles for holding the transfer member in set position when the movable spindle has been moved toward the other spindles, a cam carried by the register wheel of lower denomination for moving the lock to inoperative position, and a pawl for holding the lock in the position to which it is moved by the cam, a part of the pawl extending into the path of movement of the transfer member.

7. In an adding machine, in combination, a pair of register wheels, a spring actuated transfer member bodily movable toward and away from the wheels, means for turning the register wheels and for setting the transfer member when the transfer member is remote from the wheels, a movable lock for holding the transfer member in set position when the transfer member is adjacent the wheels, and a cam carried by the register wheel of lower denomination for moving the lock to inoperative position.

8. In an adding machine, in combination, a pair of register wheels, a spring actuated transfer member bodily movable toward and away from the wheels, means for turning the register wheels and for setting the transfer member simultaneously operable when the transfer member is remote from the wheels, a movable lock for holding the transfer member in set position when the transfer member is adjacent the wheels, a cam carried by the register wheel of lower denomination for moving the lock to inoperative position, and a pawl for holding the lock in the position to which it is moved by the cam.

9. In an adding machine, in combination, a pair of register wheels, a spring actuated transfer member bodily movable toward and away from the wheels, means for turning the register wheels and for setting the transfer member simultaneously operable when the transfer member is remote from the wheels, a movable lock for holding the transfer member in set position when the transfer member is adjacent the wheels, a cam carried by the register wheel of lower denomination for moving the lock to inoperative position, and a pawl for holding the lock in the position to which it is moved by the cam, a part of the pawl extending into the path of movement of the transfer member.

10. In an adding machine, in combination, a toothed register wheel, a main actuating rack and a spring actuated transfer rack engageable with the teeth of the register wheel in alternation, means for setting the transfer rack while the register wheel is being turned by the main actuating rack, a lock for holding the transfer rack against movement by its spring when the transfer rack is engaged with the teeth of the register wheel, another register wheel of lower denomination and a cam carried by the last mentioned register wheel for moving the lock to inoperative position.

11. In an adding machine, in combination, a toothed register wheel, a main actuating rack and a spring actuated transfer rack engageable with the teeth of the register wheel in alternation, means for setting the transfer rack while the register wheel is being turned by the main actuating rack, a lock for holding the transfer rack against movement by its spring when the transfer rack is engaged with the teeth of the register wheel, another register wheel of lower denomination, a cam carried by the last mentioned register wheel for moving the lock to inoperative position, and a pawl for holding the lock in the position to which it is moved by the cam.

12. In an adding machine, in combination, a toothed register wheel, a main actuating rack and a spring actuated transfer rack

engageable with the teeth of the register wheel in alternation, means for setting the transfer rack when the main actuating rack is engaged with the teeth of the register wheel, a lock for holding the transfer rack against movement by its spring when the transfer rack is engaged with the teeth of the register wheel, another register wheel of lower denomination, a cam carried by the last mentioned register wheel for moving the lock to inoperative position, and a pawl for holding the lock in the position to which it is moved by the cam, a part of the pawl extending into the path of movement of the transfer rack.

13. In an adding machine, the combination with the register, a spring actuated carrying member and a lock for the carrying member, of means for moving the carrying member to a position in which it is independent of the lock and means for setting the carrying member while in the said position.

14. In an adding machine, the combination with the register, a spring actuated carrying member and a lock for the carrying member, of means for separating the last two mentioned parts to render each of said parts independent of the other and means for setting the carrying member while separated from the lock.

15. In an adding machine, the combination with the register, a spring actuated carrying member and a lock for the carrying member, of means for separating the last two mentioned parts to render each of said parts independent of the other and means for setting the carrying member and the lock while so separated.

16. In an adding machine, the combination with the register, a carrying member and a lock for the carrying member, of means for separating the last two mentioned parts to render the lock independent of the carrying member and means for setting the lock while separated from the carrying member.

17. In an adding machine, in combination, a toothed register wheel, a two-armed transfer lever pivotally supported at one side of the register wheel, the arms of the transfer lever being of unequal length and the longer arm of the lever extending to the remote side of the register wheel from the lever pivot, gear teeth formed on the shorter arm of the transfer lever and engaging the teeth of the register wheel on the same side of the register wheel with the lever pivot, a spring connected to the transfer lever at the same side of the register wheel with the lever pivot, a lock engaging the longer arm of the transfer lever at the said remote side of the register wheel for holding the transfer lever against movement by its spring, a second register wheel of lower denomination than the one first mentioned and a cam carried by the said register wheel of lower denomination operable upon the lock for moving the lock out of engagement with the transfer lever.

18. In an adding machine, in combination, a series of toothed register wheel turning upon a common axis, a two-armed transfer lever for each register wheel except the one of lowest denomination, the arms of each transfer lever being of unequal length and each transfer lever being pivoted at one side of the axis of the register wheels, the shorter arm of each transfer lever engaging the teeth of the corresponding register wheel at the same side of the said axis with the pivot of the transfer lever and the longer arm of each transfer lever extending to the remote side of the corresponding register wheel from the said pivot, a plurality of springs of like strength, each spring being connected with one of the transfer levers at the same side of the said axis with the pivot of the transfer lever, a lock engaging the longer arm of each transfer lever at the said remote side of the axis of the register wheels for holding the corresponding transfer lever against movement by its spring, a cam carried by each register wheel except the one of highest denomination operable upon one of the locks to release the transfer lever associated with the register wheel of next higher denomination, and means for turning the register wheel of lowest denomination.

19. In combination, a toothed register wheel, a movable spring actuated transfer member engageable with the teeth of the register wheel for turning the register wheel one point, a lock engageable with the transfer member when the latter is engaged with the teeth of the register wheel for holding the transfer member against movement by its spring, means for moving the transfer member to a position in which it is disengaged from the teeth of the register wheel and independent of the lock, means for setting the transfer member while it is disengaged from the teeth of the register wheel, the said setting means being withdrawn when the transfer member is engaged with the teeth of the register wheel and means for controlling the lock.

20. In an adding machine, in combination, a main driving rack, a rocking frame, a register wheel mounted in the rocking frame, the said register wheel being moved into and out of engagement with the driving rack by the rocking of the frame, a second rocking frame pivotally connected with the first mentioned rocking frame, a transfer device mounted in the second mentioned rocking frame, a lock for the transfer device mounted in the first mentioned rocking frame, the transfer device being moved into and out of

coöperative relation with both the lock and the register wheel by relative movement between the two rocking frames, and means for controlling the lock.

21. In an adding machine, in combination, a main driving rack, a rocking frame, a register wheel mounted in the rocking frame, the said register wheel being moved into and out of engagement with the driving rack by the rocking frame, a second rocking frame pivotally connected with the first mentioned rocking frame, a transfer device mounted in the second mentioned rocking frame, a lock for the transfer device mounted in the first mentioned rocking frame, the transfer device being moved into and out of coöperative relation with both the lock and the register wheel by relative movement between the two rocking frames, connection between the frames whereby movement of the second mentioned frame in the direction to engage the transfer member with the register wheel and lock moves the first mentioned frame to disengage the register wheel from the driving rack and movement of the second mentioned frame in the direction to disengage the transfer member from the register wheel and lock moves the first mentioned frame to engage the register wheel with the driving rack, a spring connected with the second mentioned rocking frame to move it in the first mentioned direction, means for moving the second mentioned frame in the opposite direction and means for controlling the lock.

22. In an adding machine, in combination, a register wheel, a driving member and a spring advanced transfer engageable with the register wheel in alternation and means for retracting the transfer member operable while the register wheel is being turned by the driving member.

23. In an adding machine, in combination, a register wheel, a spring actuated transfer member shiftable between two positions and engaging the register wheel in one of said positions, a lock controlling the transfer member while in its last mentioned position only, and means for setting the transfer member while in its other position.

24. In an adding machine, in combination, a register wheel and a driving member, one of said two parts being movable for engagement with and disengagement from the other, a spring actuated transfer device and means for setting the transfer device operable upon the said transfer device throughout the period of engagement of the register wheel with the driving member.

OLIVER D. JOHANTGEN.

O. D. JOHANTGEN.

ADDING MACHINE.

APPLICATION FILED MAY 16, 1917.

1,306,112.

Patented June 10, 1919.

5 SHEETS—SHEET 1.

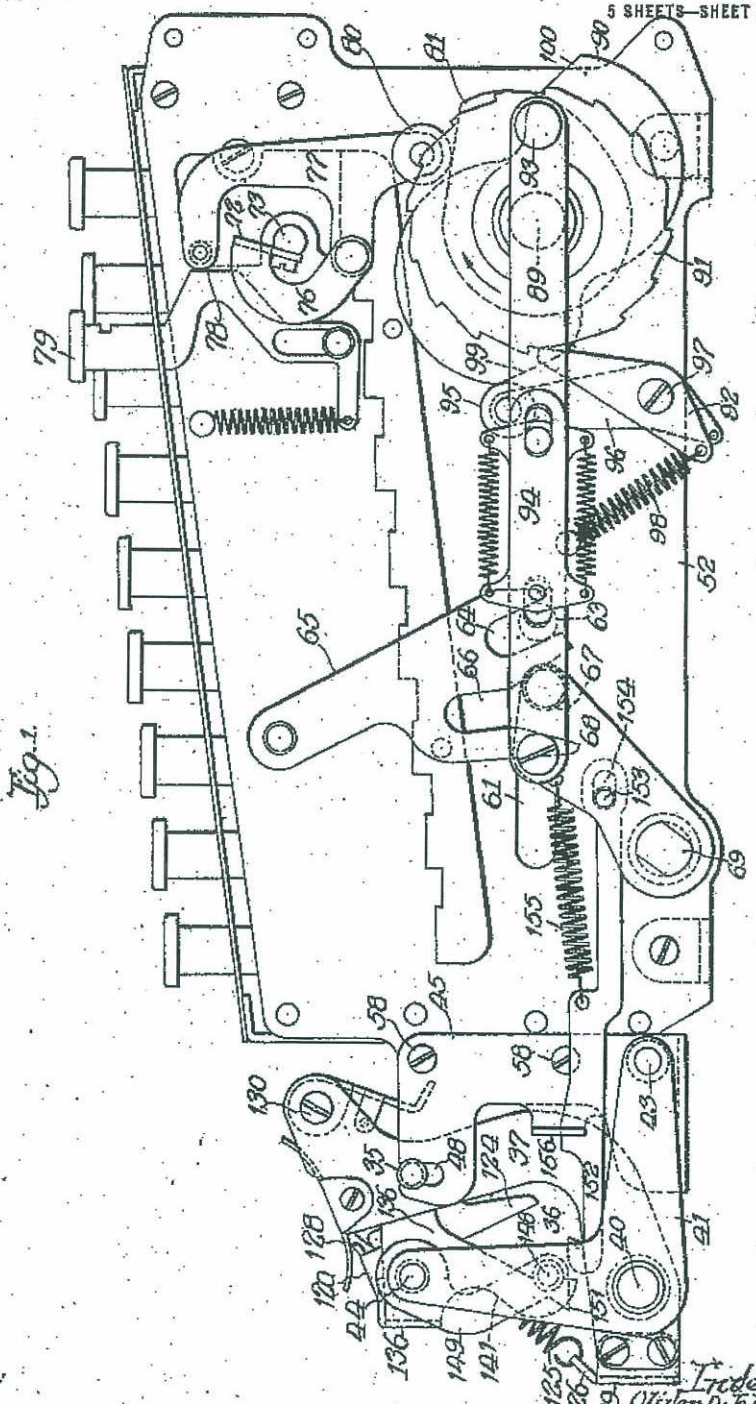


Fig. 1.

Witnesses:

Inventor.
Oliver D. Johantgen.
By Gillson & Gillson
Attys.

O. D. JOHANTGEN.

ADDING MACHINE.

APPLICATION FILED MAY 16, 1917.

1,306,112.

Patented June 10, 1919.

5 SHEETS--SHEET 2.

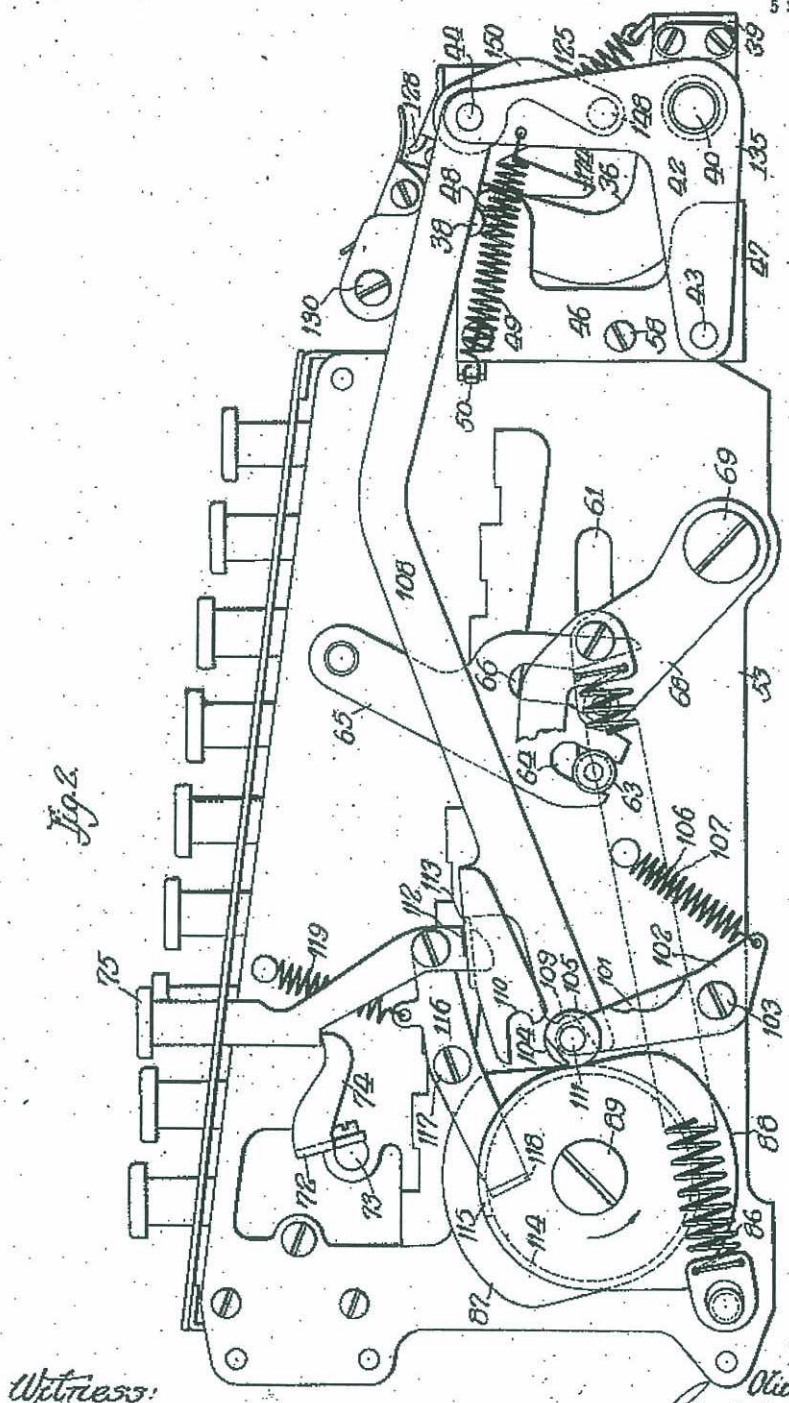


Fig. 2.

Witness:

Inventor:
Oliver D. Johantgen.

By Gillson & Gillson
Attys

O. D. JOHANTGEN.

ADDING MACHINE.

APPLICATION FILED MAY 16, 1917.

1,306,112.

Patented June 10, 1919.

5 SHEETS—SHEET 3.

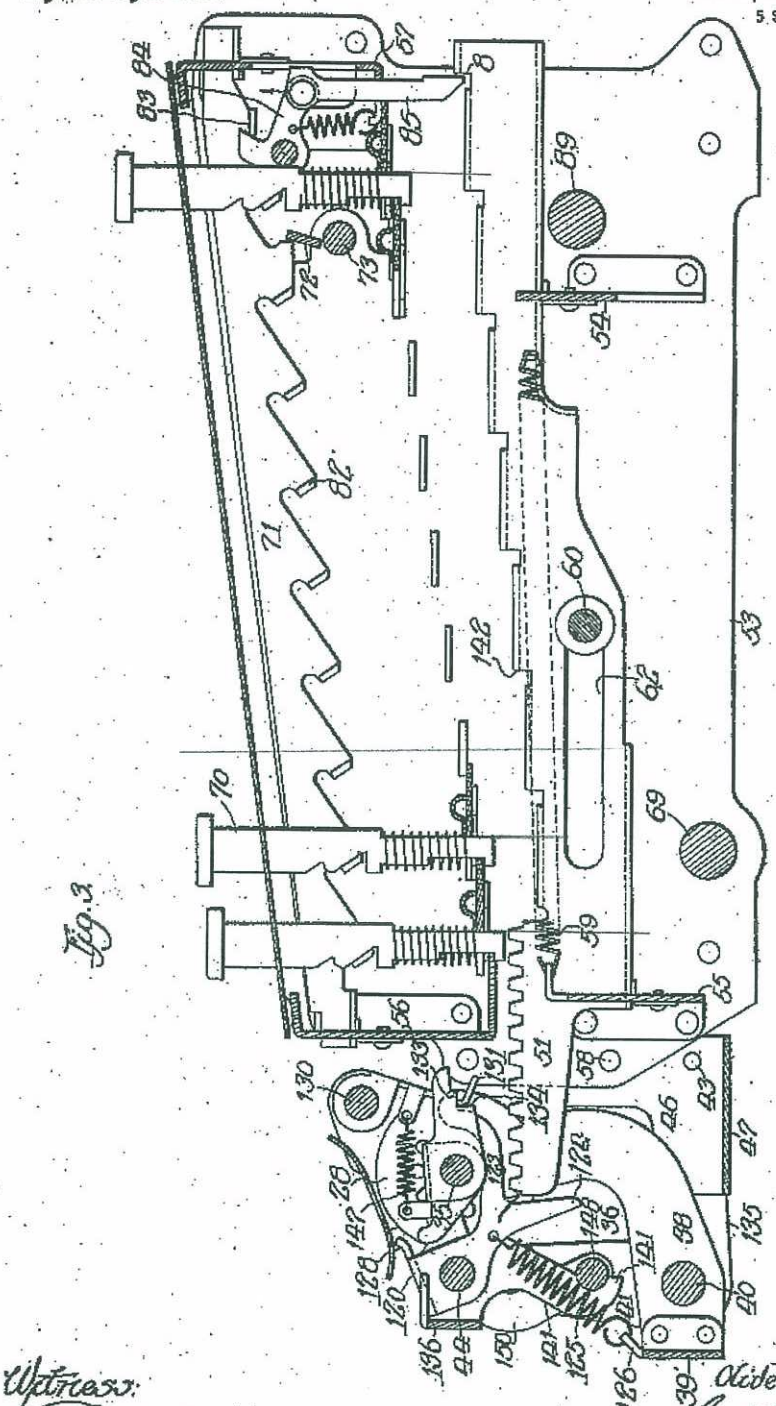


Fig. 3.

Witness:

Inventor:
Alder D. Johantgen

By Gillon & Gillon
Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

O. D. JOHANTGEN.

ADDING MACHINE.

APPLICATION FILED MAY 16, 1917.

1,306,112.

Patented June 10, 1919.

5 SHEETS—SHEET 4.

Fig. 4

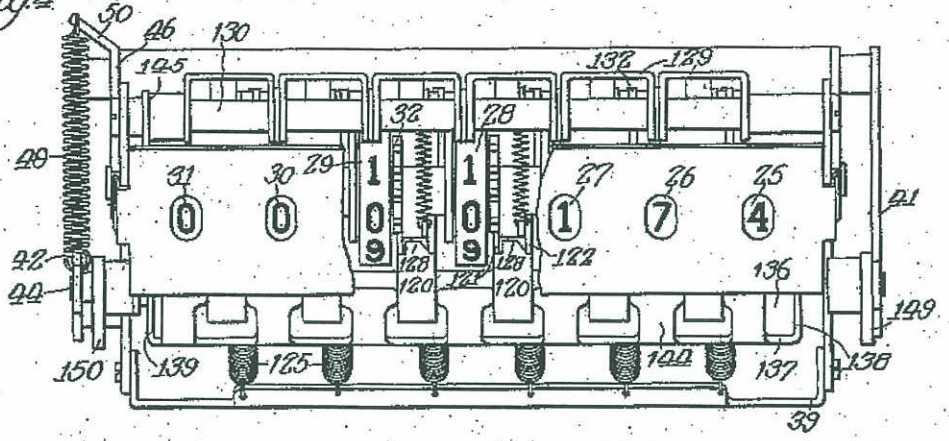


Fig. 5.

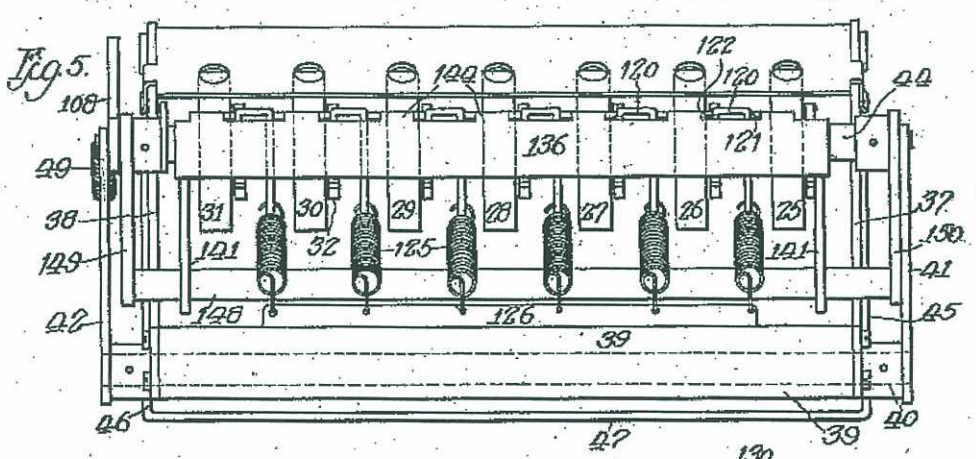
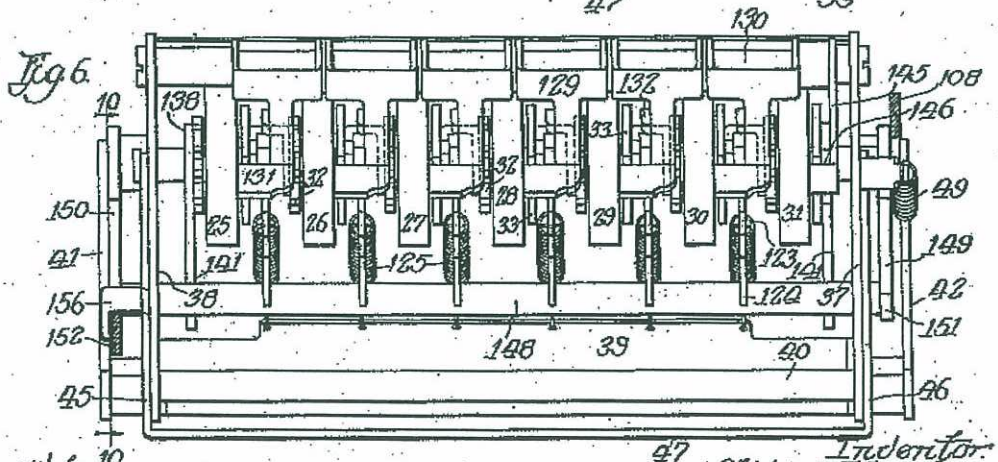


Fig. 6.



Witness:

F. C. Dorison

Inventor:

Olider D. Johantgen.

By Gillam & Gillam

Attys.

O. D. JOHANTGEN.

ADDING MACHINE.

APPLICATION FILED MAY 16, 1917.

1,306,112.

Patented June 10, 1919.

5 SHEETS—SHEET 5.

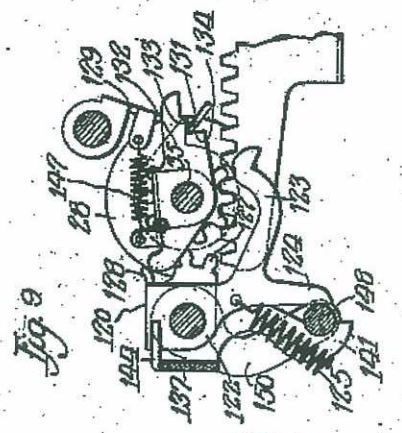


Fig. 9

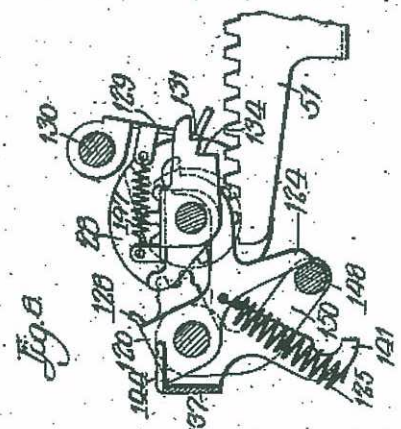


Fig. 8

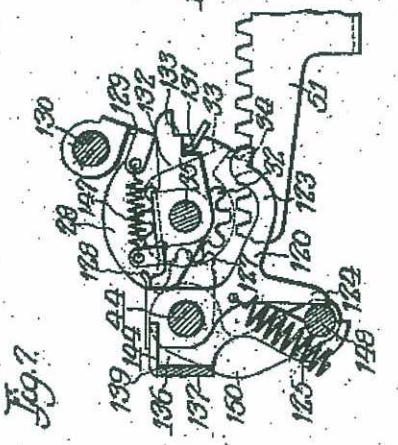


Fig. 7

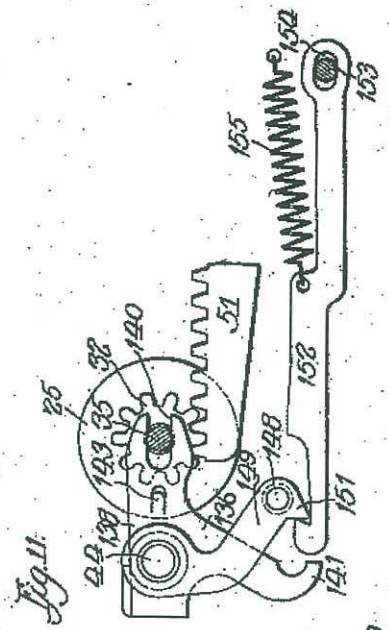


Fig. 11.

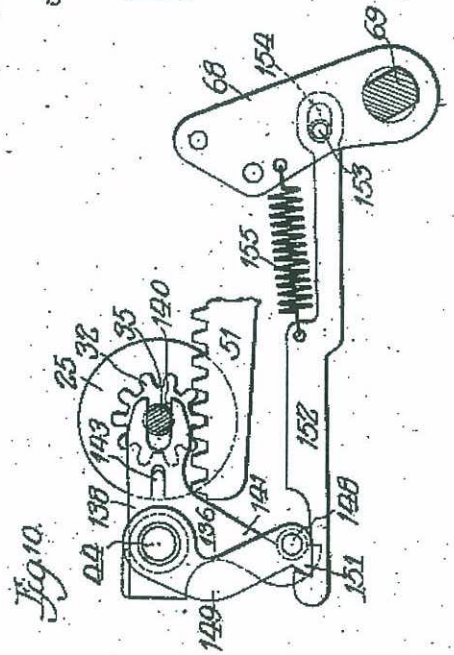


Fig. 10.

Witnesses:

Fred. C. Bowers

Inventor.

Oliver D. Johantgen.

By Gillson & Gillson

Attys.