May 30, 1933. A. KORONSKI 1,911,515

ADDING MACHINE

Filed July 29, 1925 5 Sheets-Sheet 1

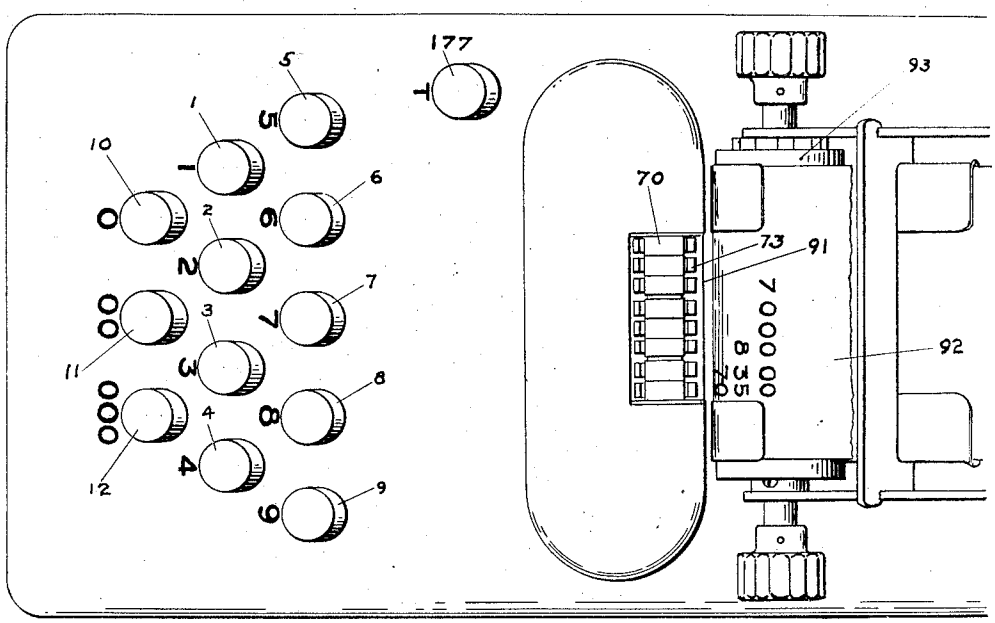


Fig. 1

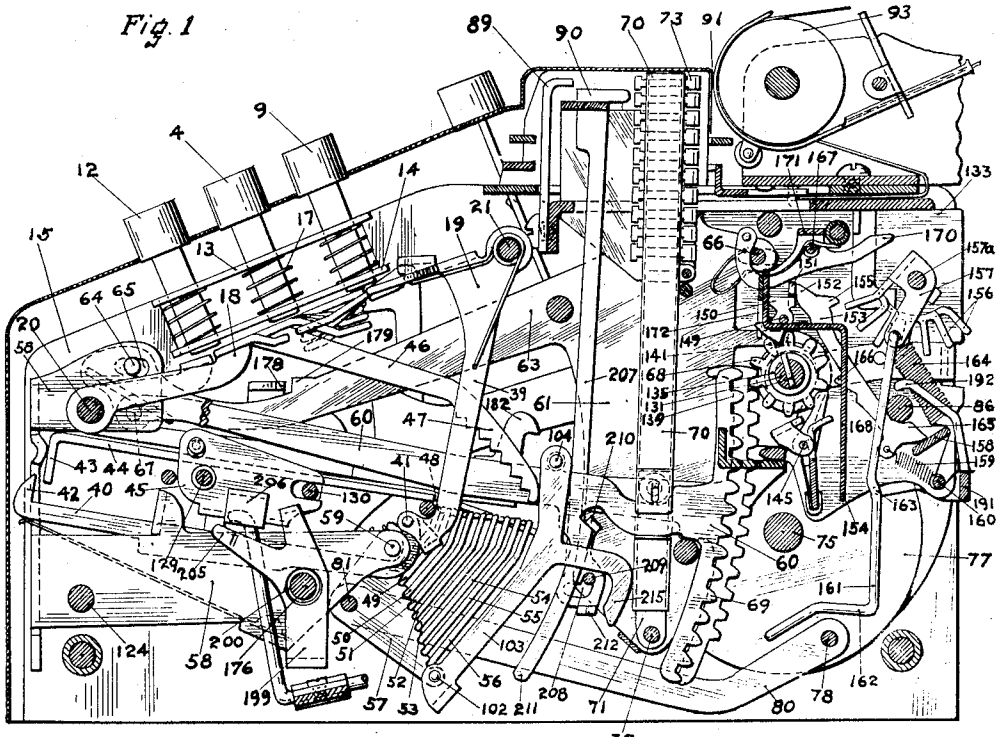


Fig. 2

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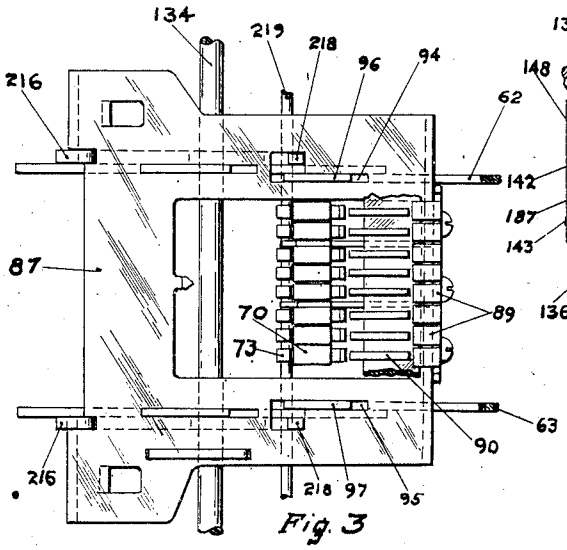


Fig. 3

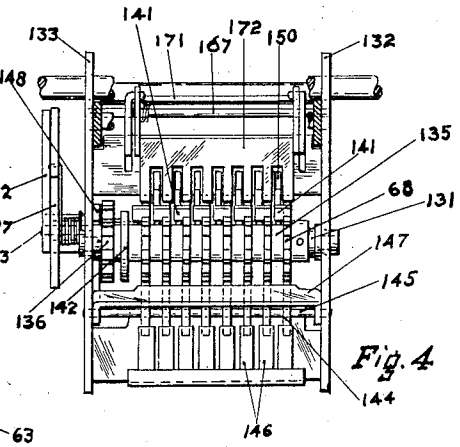


Fig. 4

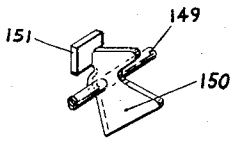


Fig. 5

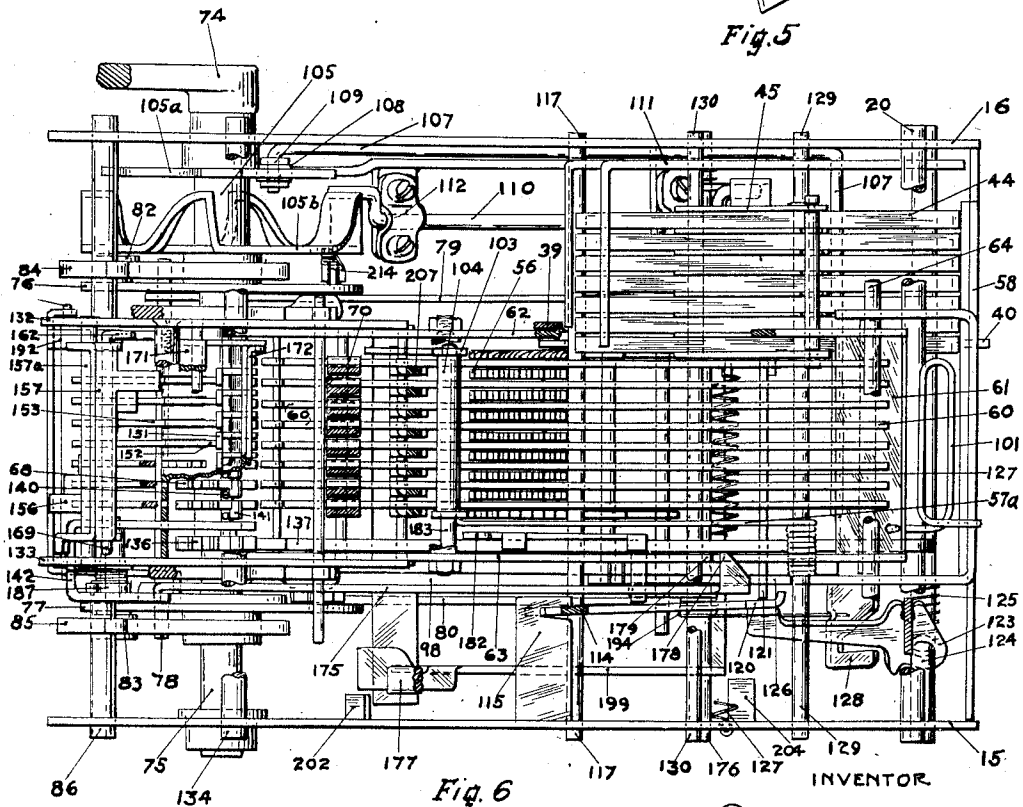


Fig. 6

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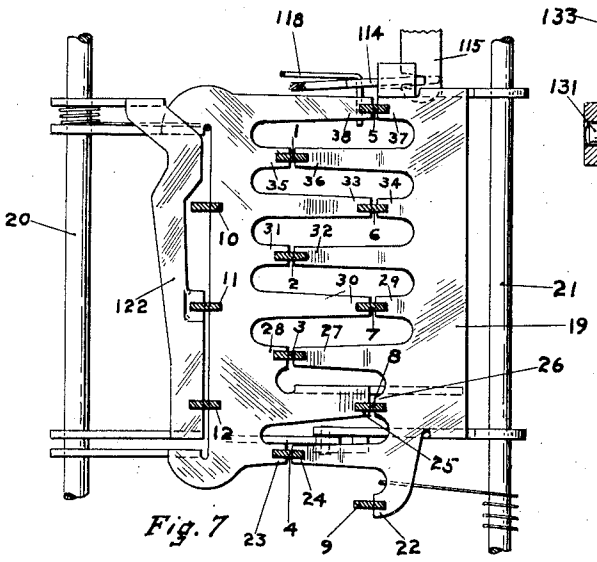


Fig. 7

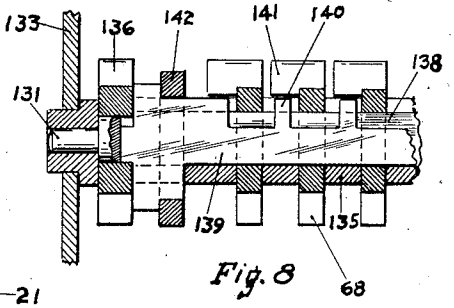


Fig. 8

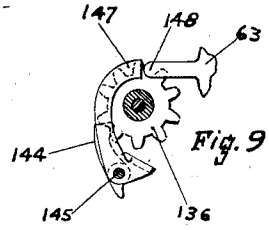


Fig. 9

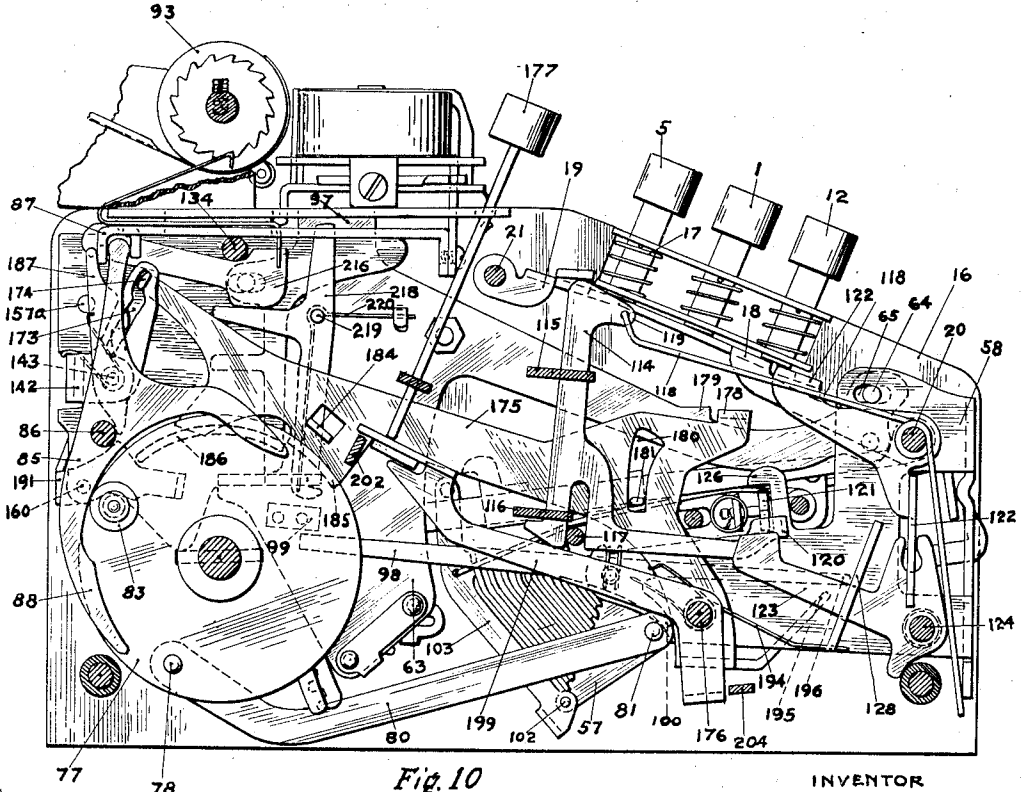


Fig. 10

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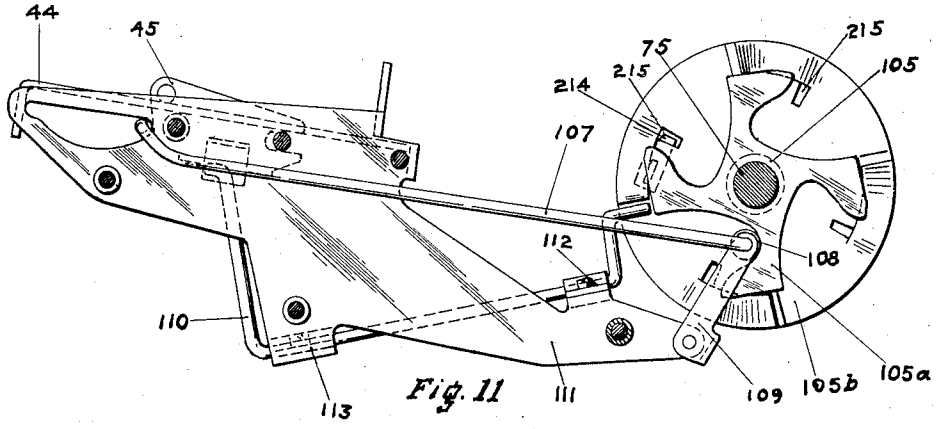


Fig. 11

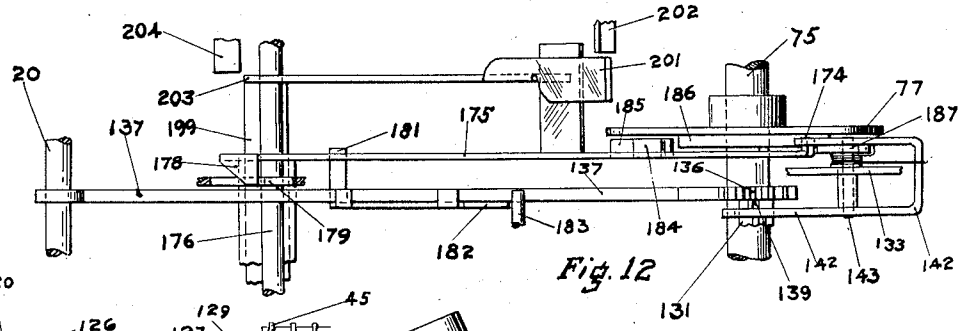


Fig. 12

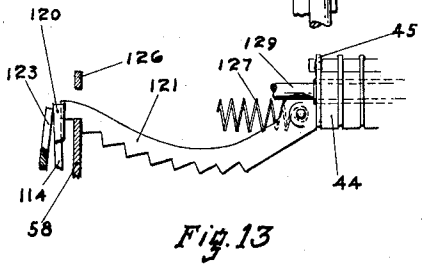


Fig. 13

Fig. 14

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Fig. 15

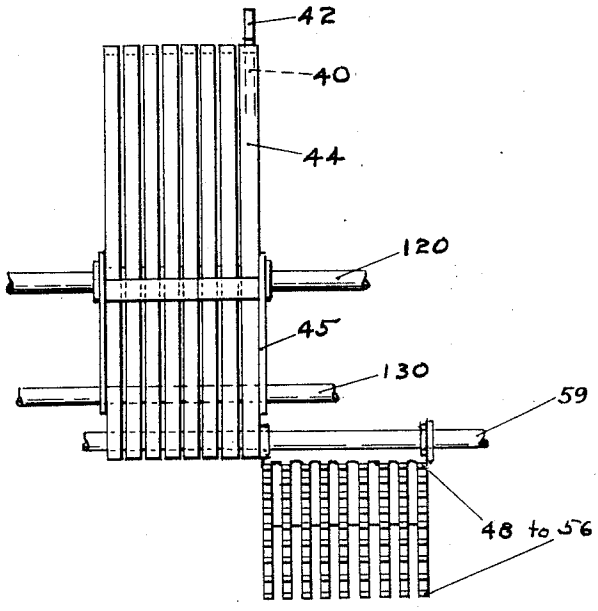
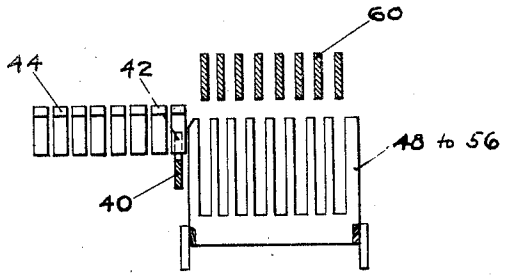


Fig. 16



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Patented May 30, 1933 1,911,515

UNITED STATES PATENT OFFICE

ANDRE KORONSKI, OF NARBERTH, PENNSYLVANIA, NOW BY JUDICIAL CHANGE OF NAME ANDREW KING

ADDING MACHINE

Application filed July 29, 1925. Serial No. 46,792.

My invention relates to the kind of adding machine known as a listing machine which prints the figures on a strip of paper.

The object of this invention is to provide a machine which shall be readily portable, mechanism which is simple in construction and so designed that the elaborate, costly and accurate construction usually used in Adding Machines will not be required.

I attain these objects by the construction shown in the accompanying drawings and in which:

Fig. 1 is a plan view of the machine, the operating lever being omitted.

Fig. 2 is a vertical sectional view looking toward the left.

Fig. 3 is a plan view of the printing frame and comb.

Fig. 4 is a front view of the totalling mechanism.

Fig. 5 shows one of the carrying over pieces.

Fig. 6 is a plan view of the mechanism with some of the parts omitted or cut away.

Fig. 7 is a plan view of the parts which transfer the numbers from the keys to the pins.

Fig. 8 is a section thru the totalling reset.

Fig. 9 shows the pawl disengaging mechanism.

Fig. 10 is a side view of the mechanism looking toward the right.

Fig. 11 shows the pin and pin carriage reset.

Fig. 12 is a plan view of Fig. 14.

Fig. 13 is a side view of the means for limiting the motion of the pin carriage.

Fig. 14 is a sectional view showing the relation between the totalling key and the mechanism associated therewith.

Fig. 15 is a diagrammatic, side view drawing in which the mechanism has been spread out in order to show the relation between the various parts more clearly.

Fig. 16 is a section taken transversely in Fig. 15 and shows the relation between the segments 60, the pins 44 and the combs 48 to 56.

For greater clearness all parts which tend to confuse the drawings have been omitted.

Referring to Figs. 1 and 2, 1 to 12 inc. are operating keys which are supported in the plates 13 and 14 which are supported by the side plates 15 and 16. These keys are kept in place by the springs 17. The keys 1 to 8 inc. contact at their lower ends with the frames 18 and 19, Figs. 2 and 7, which are pivoted on the rods 20 and 21 which are supported in the side plates. The 9 key contacts only with the frame 19. The fingers 22 to 38 inc. integral with the frames 18 and 19, are located at different distances below the ends of the keys 1, 2, etc. and the depression of these keys will therefore rotate the frames 18 and 19 thru different arcs.

The frame 19 is provided with an arm 39 to which is pivoted the pawl 40 at the point 41, Fig. 2, and the end 42 of the said pawl is in the path of the bent down portion 43 of the pins 44 which are carried in the pin carriage 45 so as to be capable of being moved longitudinally therein one at a time under the influence of the pawl 40, Figs. 2 and 6.

The pin carriage 45 is located as shown in Fig. 6 normally with the first pin to the left over the pawl 40, and as each pin is moved toward the rear by a key thru the frames 18 and 19 and the pawl 40, the said carriage moves one space to the left placing the second pin in the path of the pawl, etc. The frame 18 is provided with an arm 46 which is provided with steps 47, one for each number from 1 to 8 inc., which lie in the path of the same pin which is over the pawl 40. The operating keys rotate the frames 18 and 19 so that the pins 44 are moved toward the rear in Fig. 2 to distances proportional to the number of the operating key, the pins being moved by the operation of the frame 19 and arrested at the proper place by the frame 18.

The pins 44 move to the left and over a series of nine combs 48 to 56 inc. which are pivotally supported at their lower ends in the frame 57 which is pivoted to the frame 58 at the point 59 so as to be capable of limited rotation thereon.

When the frame 57 is rotated about the point 59 the comb 48 moves up a distance equal to adding 1 on the machine and the

comb 56 moves up a distance equal to adding 9 on the machine with the intermediate combs moving up proportional distances.

Located above the slots in the said combs are the segments 60 which are mounted in the carriage 61 which is composed of two side plates 62 and 63 and suitable members connecting them rigidly together. This carriage is capable of a $\frac{1}{8}''$ motion to and fro and is supported at one end on a roller 64 which is supported in the slots 65 in the frame 58 and at the other end on the roller 66 which is supported in similar slots in the plates 132 and 133 of the totalling unit, Figs. 10 and 2.

As the pins 44 are moved toward the rear by the action of the frames 18 and 19 it will be seen that they block up one of the slots in the comb according to the number of the key depressed and as the frame 57 is rotated the combs move the pins 44 upward and raise the segments above said pins to an amount equal to the number of the key depressed gradually and without shock.

The segments 60 are pivoted in the carriage 61 on the pin 67 and move with the carriage 61. They are in the same plane as the gears 68 of the totalling mechanism. When the carriage 61 is in its normal position the teeth 69 of the segments 60 are out of mesh with the gears 68 but when the carriage 61 is in its rearward position the said teeth mesh with said gears.

The type members 70 consist of virtually flat tubes which slip over the flat bars 71 which are pivoted on the rod 72 which is supported in the carriage 60. The upper ends of the members 70 are provided with type 73 slidably supported therein and which bear the numerals 0 to 9 inc. These bars are connected to the segments 60 so as to move with them. Fig. 2.

The operating lever 74, Fig. 6, is rigidly attached to the shaft 75 which is pivoted in the side plates 15 and 16. Rigidly attached to the shaft 75 are the discs 76 and 77 in which is pivoted the pin 78 on which are pivoted the connecting bars 79 and 80 the other ends of which are connected thru the pin 81 to the frame 57, so that as the said operating lever is rotated it rotates the frame 57 and raises the combs. The motion of the frame 57 is practically the same as that of the operating lever at the beginning of the stroke but becomes zero as the bar 78 passes over center, all of the combs being raised during the whole of this part of the movement of the operating lever. Pivoted to the discs 76 and 77 are the rollers 82 and 83, Figs. 6 and 10 which rotate the levers 84 and 85 toward the end of the stroke of the operating lever.

The levers 84 and 85 are pivoted on the bar 86 which is supported in the plates 15 and 16 and move the frame 87 toward the rear, Figs. 2, 3 and 10. The fingers 88 cooperate with the pin 78 to return the said levers to their normal positions on the upstroke of the operating lever. The frame 87 is provided with a printing comb 89 which, thru the medium of the pieces 90, presses the type against the ribbon 91, the paper 92 and the roller 93 to print the numbers on said paper.

As the frame 87 is moved toward the rear the ends of the slots 94 and 95, Fig. 3, contact with the projections 96 and 97 of the plates 62 and 63 and draws the carriage 61 toward the rear. The pawl 98, Figs. 6 and 10, cooperating with the block 99 rigidly attached to the plate 63 holds the carriage 61 in its rearward position until the end of the upstroke of the operating lever 74 at which time the said pawl is disengaged by the action of the pin 81 on the finger 100 integral with the pawl 98 thus allowing said carriage 61 to move forward under the influence of the spring 101.

Pivoted to the frame 57 on the pin 102 is the frame 103 in which is mounted the bar 104 which is located over the segments 60 and this returns the segments to their normal positions on the upstroke of the operating lever, and since the segments are in mesh with the totalling gears during this time, the gears are rotated proportionately to the movements of the said segments and each time the same number has been printed on the paper 92. The frame 103 is guided by the retainer 57*a* which is hooked into the said frame and pivoted on the rod 129.

As has been explained, each time a key is depressed one of the pins is moved toward the rear and sideways and these pins are required to stay in this position during the downstroke of the operating lever but on the upstroke they are reset by means of the reset cam 105, Figs. 6 and 11, made up of two cams rigidly joined together of which the cam 105*a* moves the pins back to their zero positions thru the medium of the piece 107 the roller 108 and the lever 109, and the cam 105*b* moves the pin carriage 45 back to its normal position at the right as shown in Fig. 6 thru the medium of the lever 110 which is pivotally mounted to the piece 111 by the bearings 112 and 113. The timing of these cams is such that the pins are reset before the carriage begins to move. The frame 111 is rigidly attached to the side plate 16. The cam 106 is driven in a clockwise direction in Fig. 11 by the motion of the disc 76 thru the pawl 214 pivoted to said disc and engaging the openings 215 in the cam 105*b*.

The keys 10, 11 and 12 do not move the pins 44 but simply move the carriage 45 laterally a distance of 1, 2 and 3 spaces respectively corresponding to the same number of zeros. The key 10 moves only the

frame 18 and this actuates the piece 114, Figs. 6 and 10, which is supported in the guides 115 and 116 and is further guided by the rod 117 and the spring 118 which both raises the said piece 114 and pushes sideways on the end 119 toward the right. The piece 114 is provided with an end 120 which, as a key is depressed, drops below the end of the toothed cam lever 121 which is pivotally mounted on the carriage 45 and raises it. The cam lever 121 is toothed so that the end 120 can lift the teeth successively and thus allow the carriage 45 to move one space to the left each time a key is depressed, the carriage being drawn by the spring 127. The piece 114 is also operated by the frame 19 and since the frames 18 and 19 each move different distances according to the key depressed, for numbers 5 to 9 inclusive, the frame 19 operates the piece 114 but for the balance of the numbers and for the zeros the said piece 114 is operated by the frame 18.

The keys 11 and 12 in addition to operating the frame 18 operate also the frame 122, Figs. 7 and 10 which is pivoted on the rod 20 and which operates the piece 123 which is loosely pivoted on the rod 124 and held in position by the spring 125, Figs. 6 and 10. The piece 123 raises the end of the cam lever 121 one tooth when it is actuated thru the "00" key 11 and two teeth when actuated thru the "000" key 12 as these keys move down. Thus the key 11 allows the carriage 45 to move two places and the key 12 allows said carriage to move three places to the left.

The keeper 126, Figs. 10 and 13, prevents the lever 121 from jumping a tooth. Lateral motion of the piece 123 is limited by the slot in the bracket 128. The carriage 45 is supported on the rods 129 and 130 which are supported in the side plates 15 and 16.

The gears 68 are mounted on a slotted spindle 131, Figs. 2, 4, 6 and 8, which is pivoted in the side plates 132 and 133 of the totalling unit which is supported in the plates 15 and 16 by means of the rods 86 and 134. These gears are held in the proper spacing on the spindle 131 by the separators 135 and rigidly attached to one end of said spindle is the gear 136 which meshes with the totalling segment 137, Figs. 2, 6, 12 and 14, which is pivoted on the rod 20 and by which said spindle is rotated while totalling.

Lying in the slot 138 in the spindle 131 is the reset key 139 which is provided with teeth 140, one for each of the gears 68, and opposite the teeth 141 integral with each gear and extending to the left as shown in Fig. 8. The key 139 passes thru a hole in the lever 142, Figs. 2, 3 and 8, by which it is operated, the said lever being pivoted on the pin 143 which is carried in the plate 133. The lever 142 is capable of a small angular motion so as to move the key 139 so that the teeth 140 can be placed in the path of the teeth 141 when totalling. Normally the teeth 140 are down in the position shown in Fig. 8.

The gears 68 are held in their proper angular positions by the pawls 144, Figs. 2, 4 and 9, which are pivoted on the pin 145 and held in operative position by a gang spring 146. The frame 147, which is operated by the motion of the carriage 61 thru the medium of a finger 148 integral with the carriage 61, disengages all the pawls 144 from the gears 68 while the carriage 61 is in its rearward position. The gears 68 are capable of rotating independently of each other on the spindle 131 and are rotated in a counter-clockwise direction in Fig. 2 by the segment 60 and by the carryover mechanism, and in a clockwise direction when totalling.

Pivoted on the pin 149 are the carryover pieces 150, Figs. 2, 4, 5 and 6, which are provided with a bent part 151 against which rest the ends 152 of the carryover latches 153, Figs. 2 and 6. The pieces 150 are held in position in line with the teeth 141 by slots in the plate 154 and make a partial rotation each time the gears 68 make one revolution, and this moves the carryover latch 153 out and places the nose 155 in the path of the fingers 156 of the carryover actuator 157 pivoted on the rod 157*a*. There is one finger for each latch and they are so spaced radially that they will actuate the latches 153 one after another beginning at the units end.

The carryover latches are located in slots in the plate 154 in the plane of the gears 68 and stand on the bar 158 and against the rod 86, being held in position by the springs 159 which hook over the rod 160.

The actuator 157 is operated thru the medium of the piece 161 which is engaged by the rod 78 each time the operating lever 74 is pulled down, the end 162 disengaging itself from the rod 78 after the actuator has been rotated sufficiently to actuate all the latches, by the contact of the shoulder 163 with the rod 86, at which time the actuator is snapped back to its normal position by the spring 164. As the latches 153 are raised by the actuator 157 the shoulder 165 riding on the rod 86 forces the teeth 166 into the gears 68 and as this lever 153 rises it adds "1" in the gear 68 of next higher denomination. When the latch 153 is raised sufficiently, the end 152 contacts with the bar 167 which strips the latch 153 from the finger 156 and allows the latch to go back to its normal position. The hump 168 prevents the latch 153 from adding more than "1" in the gear 68. Each time the actuator 157 is actuated the end 169 of the piece 161 contacts with the finger 170 of the frame 171 which is pivoted on the bar 167 rotating it slightly, and pivoted to the frame 171 is the comb 172. Figs. 2 and 4, which, when

the frame 171 is rotated as above, resets the carryover pieces 150 and any of the gears 68 which may have rotated only partly.

The lever 142, Figs. 2, 10 and 14, is provided with a cam slot 173 in which rides the end 174 of the totalling lever 175 which is pivoted on the rod 176 and operated by the totalling key 177 at which time it rotates the lever 142 so as to raise the key 139. At the same time the projection 178 engages the edge 179 of the carriage 61 moving said carriage toward the rear and engaging the segments 60 with the gears 68. The slot 180 engages the finger 181 of the hook 182 which is slidably attached to the totalling segment 137 and moves the hook 182 over the end 183 of the bar 104. The totalling lever 175 is provided with two lips 184 and 185 which lie in the path of the lip 186 integral with the disc 77 so that when the totalling lever is down lip 184 is below the lip 186. The totalling lever is held down by the latch 187 which is pivoted to the pin 143.

At this time the end 189 of the lever 175 contacts with the end 190 of the safety frame 191 pivoted on the rod 160 and causes the finger 192, Figs. 2, to hold the piece 161 out of engagement with the bar 78 to prevent the actuator 157 from operating during this time, as the carryover and the totalling operate the gears 68 in opposite directions which might wreck the machine.

After the totalling key has been depressed the operating lever 74 is pulled down. This rotates the segment 137 thru the hook 182 and the end 183 of the bar 104 and by means of the key 139 the gears 68 are reset to their zero positions which raises the segments 60 to numbers corresponding to the numbers which have been accumulated on the gears 68 and the action of the frame 87, etc. prints this amount on the paper.

As the frame 87 moves it disengages the latch 187 from the end 174 of the totalling lever. During this time the lip 184, Figs. 10, 12 and 14, has been riding under the lip 186 the end 193 of which, when the lever 74 is in its lowest position, passes past the lip 184 allowing the lever 175 to rise under the influence of the spring 194 until the lip 185 comes in contact with the lower side of the lip 186. During the time the lever 175 is down it also holds the pawl 98 out of engagement with the block 99 by means of the finger 195 which contacts with the finger 196, Fig. 10, and when the lever 175 has been allowed to rise partly as just explained it releases the projection 178 from the edge 179 but still holds the pawl 98 out of engagement with the block 99 and as the end 74 rises the lever 175 is held partly down until, at the end of the stroke, the lip 186 releases the lip 185 of the lever 175 and allows said lever to return to its normal position. During the return stroke of the lever 74 the gear 136 is rotated back to its normal position and when the lever 74 returns to its normal position it rotates the lever 142 thus putting the key 139 back to normal.

In order to be sure that the machine cannot add and total at the same time, and interlock 199 is provided which is pivoted on the rod 176 and is also capable of some motion along it, Figs. 2, 6, 12 and 14. This lock is pushed toward the left by the spring 200 but when the pin carriage 45 is in its initial position it holds the said lock toward the right so that the end 201 is away from the stop 202 at which time the totalling key can be depressed and when it is so depressed the part 203 is placed in the path of the stop 204, and the finger 205, Fig. 2, passes under the lip 206 and prevents the carriage 45 from moving toward the left. When the totalling lever is in its normal position and the carriage 45 is one or more spaces to the left the end 201 is over the stop 202 which prevents the totalling key from being depressed.

In order that the zeros which are always on the printing line, shall print only to the right of a number, the pieces 207, one for each segment, Figs. 2 and 3, are provided the upper ends 90 of which are normally just below the line of the fingers of the printing comb 89. The pieces 207 are provided with L-shaped openings 208 thru which passes the pin 209 which is supported in the carriage 61. The pieces 207 are also provided with a laterally extending lip 210 which lies in the path of the cam 211 integral with the segment 60 so that when a segment is raised one or more spaces it will raise the corresponding piece 207 until the end 90 is in line between the printing comb 89 and the first line of type. Each piece 207 has a laterally extending finger 212 which extends under the piece 207 of the next lower denomination, so that all the pieces 207 to the right of the number will be raised but none to the left.

The frame 103 is provided with a finger 215, Fig. 2, which contacts with the projection 212 of the last piece 207 to the right which resets all the said pieces.

The cam pieces 216, the levers 218 pivoted on the bar 219 and the springs 220 form a means for lining up the type but as these are common in the arc a further description is not thought necessary.

I am aware that adding and listing machines are not new and I therefore claim:

1. In a listing machine the combination of a series of segments having spaces between them, a series of fingers rising to various heights between said segments and means for blocking off any of the spaces between said fingers to cause said segments to rotate as the said fingers rise.

2. In a listing machine the combination

of a carriage carrying a series of pins, manually operated keys for moving said pins to different positions, adding and totaling means including a series of segments, means for moving said carriage each time a pin has been moved so as to place said pins under said segments and means for so raising said pins as to raise said segments according to the number on the key depressed to set said number into said totalling means.

3. In a listing machine the combination of an adding means including a series of segments, an operating lever, nine members operated by said lever and moving proportionately thereto but to varying heights and means for causing any of said segments to be raised by said members.

4. In a listing machine the combination of a series of twelve manually operable keys, "1" to "9" and "0", "00" and "000" respectively; totalling means including a series of longitudinally disposed members, a series of pins assembled in a carriage capable of motion at right angles to said members so as to place said pins under said members, pin operating means actuated by said keys and including an actuating member, a stop member and means including a stepped cam lever capable of being raised from one to three spaces and thereby allow said carriage to move one space each time a number or a "0" key is depressed and two and three spaces respectively when the "00" or the "000" keys are depressed and means for causing said pins to raise said members to add the numbers on the keys depressed into said totalling means.

5. In a listing machine the combination of manually operable keys, a series of movable pins, an actuating member and a stop member cooperating when operated by said keys to move said pins longitudinally and stop them in various positions according to the key operated, means for moving said pins also laterally and means operated thru said pins for totalling the numbers so set by said keys.

6. In a listing machine the combination of a series of pins disposable to various positions longitudinally proportionately to the number to be added, pin positioning means, means for moving said pins after they have been positioned and means whereby the said numbers, as determined by the positions and movements of the pins, are added and printed.

7. In an adding machine, an operating member, 9 members rising from 1 to 9 spaces each time the operating member is actuated, adding members, manually operated members for setting numbers into said machine and means whereby said manually operated members connect said adding members to one of said 9 members for each digit to add said number when said operating member is actuated.

8. In an adding machine, an operating means, a pivoted member moving thru an arc so that its free end moves 9 spaces and the intermediate points move from 1 to 8 spaces, a rigid connector pivoted to said operating means and said pivoted member so that said pivoted member moves thru its arc during the stroke of said operating means, adding means and movable means which can be placed on said pivoted member at any point along it radius so that the said pivoted member will raise said means and said adding means to distances corresponding to the point along said radius at which said movable means has been placed and which corresponds to the number added, when the operating means is actuated.

9. In an adding machine, a series of segments comprising part of an adding means, operating means, a second series of members moving thru different distances relative to said segments during the same time interval and operated by said operating means and means for causing said second series of members to operate any of said segments thru the medium of said operating means.

10. In an adding machine the combination of a carriage capable of lateral movement one space for each unit, a stepped cam lever coacting with a stop to limit the movement of said carriage, a series of manually operable keys operating a release for said cam to make the above named one step movement as the operating key is allowed to rise, a key 11 for 00, a key 12 for 000 and means whereby said last named keys release said toothed cam one and two spaces respectively on their down stroke to allow said carriage lateral movement of one and two spaces and means whereby said 00 and 000 keys release said cam one additional space on their up stroke thereby allowing said carriage to move laterally two or three spaces according to the key depressed.

11. In a calculating mechanism the combination of number setting means, accumulating means and means including a series of members moving in arcuate paths about a common center for transferring the numbers set by said setting means to said accumulating means.

12. In a calculating mechanism the combination of number setting means, accumulating means and means including a series of members moving to different distances about a common center for transferring the numbers set by said setting means to said accumulating means.

13. In a calculating mechanism the combination of number setting means, accumulating means and means including a series of members moving thru different distances during the same time interval with a motion

varying from a maximum at the beginning gradually down to zero at the end of their motion to transfer the numbers set by said setting means to said accumulating means.

14. In a calculating machine the combination of a series of members capable of being raised to varying heights, a pivoted actuating lever and means connecting said lever to said series of members such that said series of members are raised to their highest positions when the end of said connecting means which is attached to said lever reaches dead center.

15. In a listing machine, a series of manually operated keys, a series of pins moveable longitudinally thru the operation of said keys to distances varying according to the number added, accumulating means and means whereby said accumulating means is actuated to receive the numbers set by said longitudinal movement of said key set pins.

16. In a listing machine, key actuated pins disposable thru distances which vary according to the number added, accumulating means and means whereby said accumulating means is set to different positions depending on the distance thru which said pins have been moved thru the operation of said keys.

17. In a listing machine the combination of, key operated, longitudinally moveable members; accumulating means and means whereby the longitudinal distances thru which said members have been moved is translated into a corresponding movement of said accumulating means.

18. In a listing machine the combination of, accumulating means, means for setting numbers into said accumulating means, and means whereby the means which sets "1" moves the accumulating means to the "1" position during the same time that the means which sets "9" moves the accumulating means to the "9" position.

19. In a listing machine the combination of, accumulating means, means for setting numbers into said accumulating means and means whereby said setting means sets all numbers during the same time interval into said accumulating means.

20. In a listing machine the combination of, number accumulating means, means for setting numbers into said accumulating means, said number setting means moving to different positions according to the number set: operating means therefor, and means whereby said number setting means begins and ends its travel during the same part of the movement of said operating means required to set said numbers into said accumulating means.

21. In a listing machine the combination of, number accumulating means and number setting means including means all parts of which move to their respective positions during the same time interval when setting numbers into said accumulating means.

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