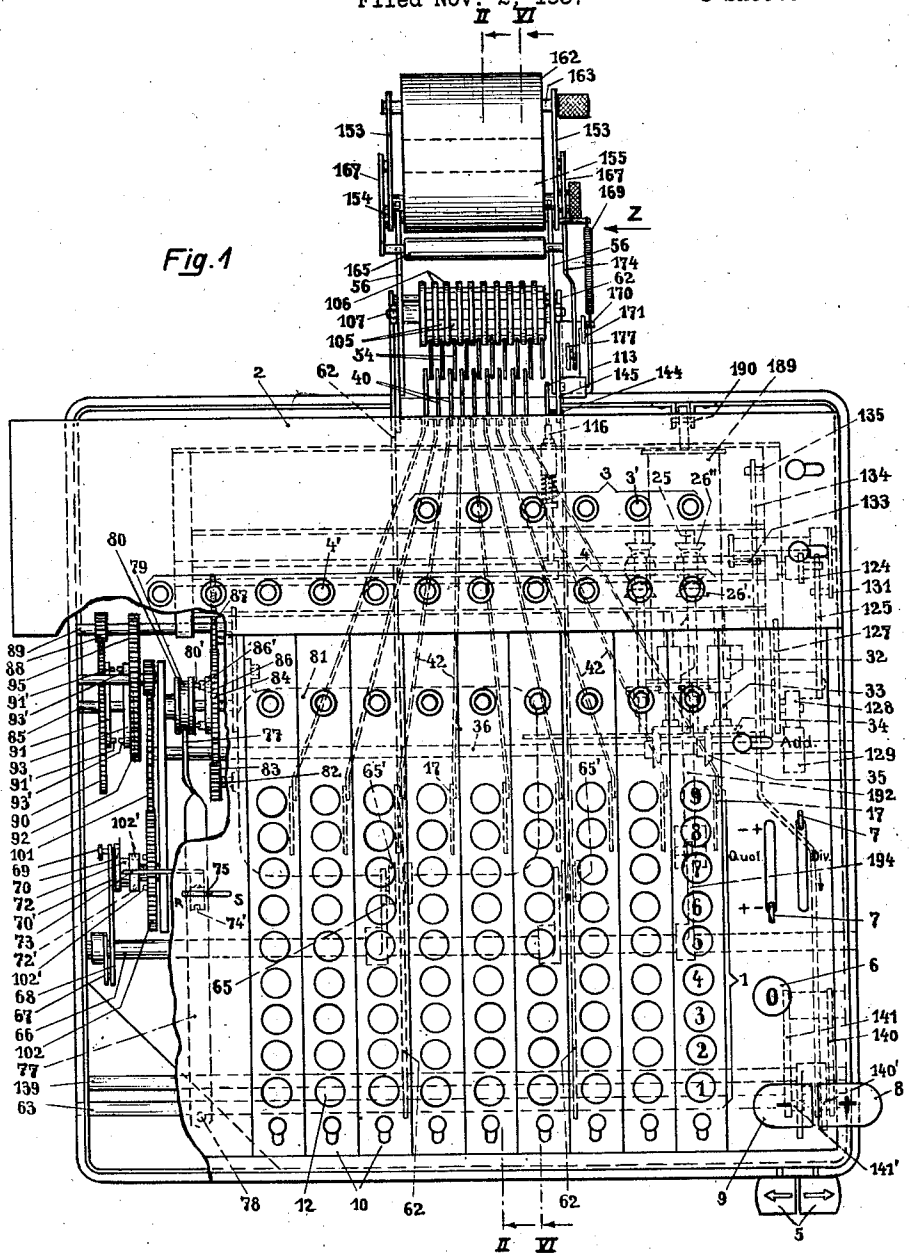
Jan. 25, 1944. U. EICHLER 2,340,261

CALCULATING AND REGISTERING MACHINE

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Fig. 1



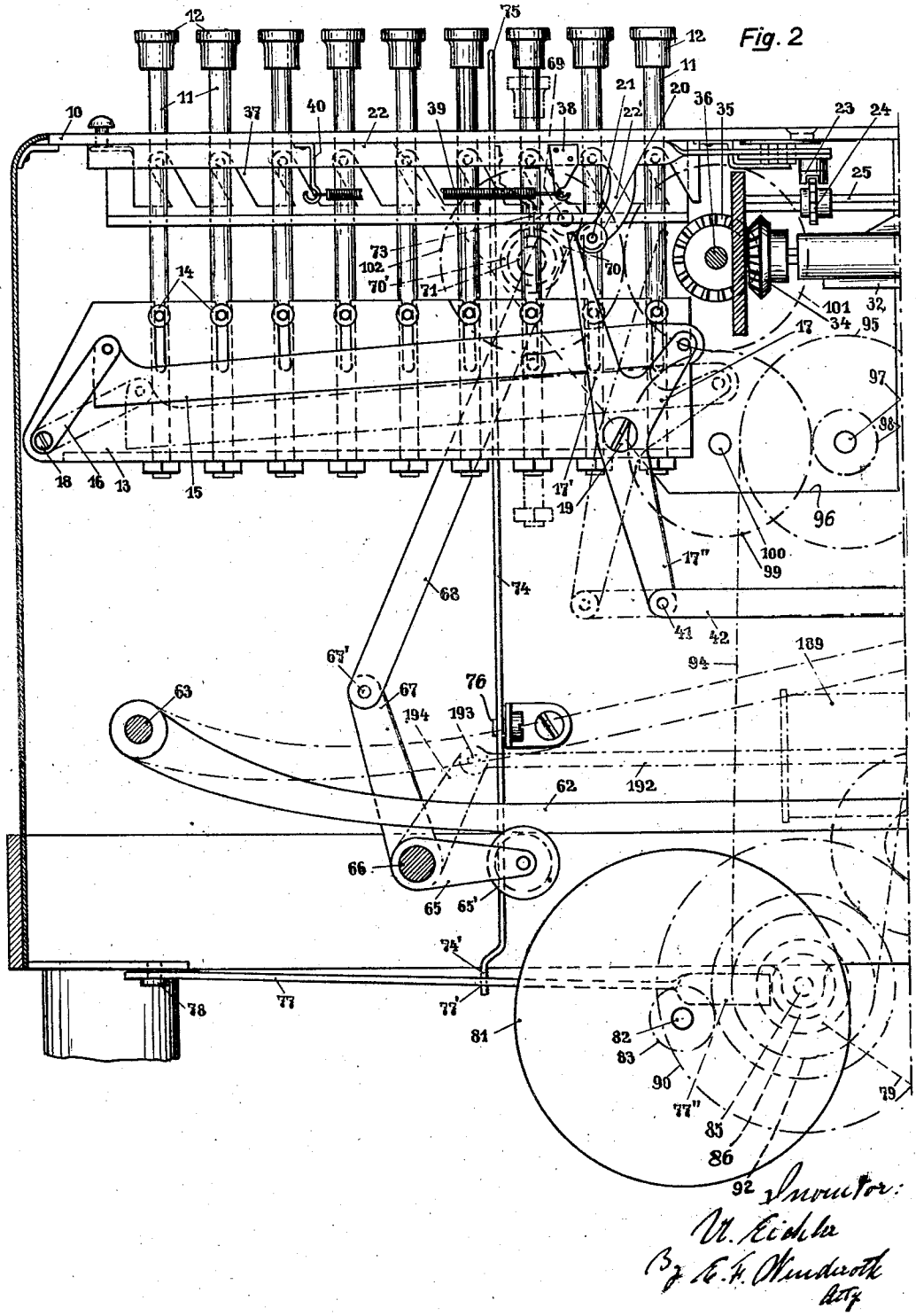
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CALCULATING AND REGISTERING MACHINE

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Fig. 2



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CALCULATING AND REGISTERING MACHINE

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Fig. 2A.

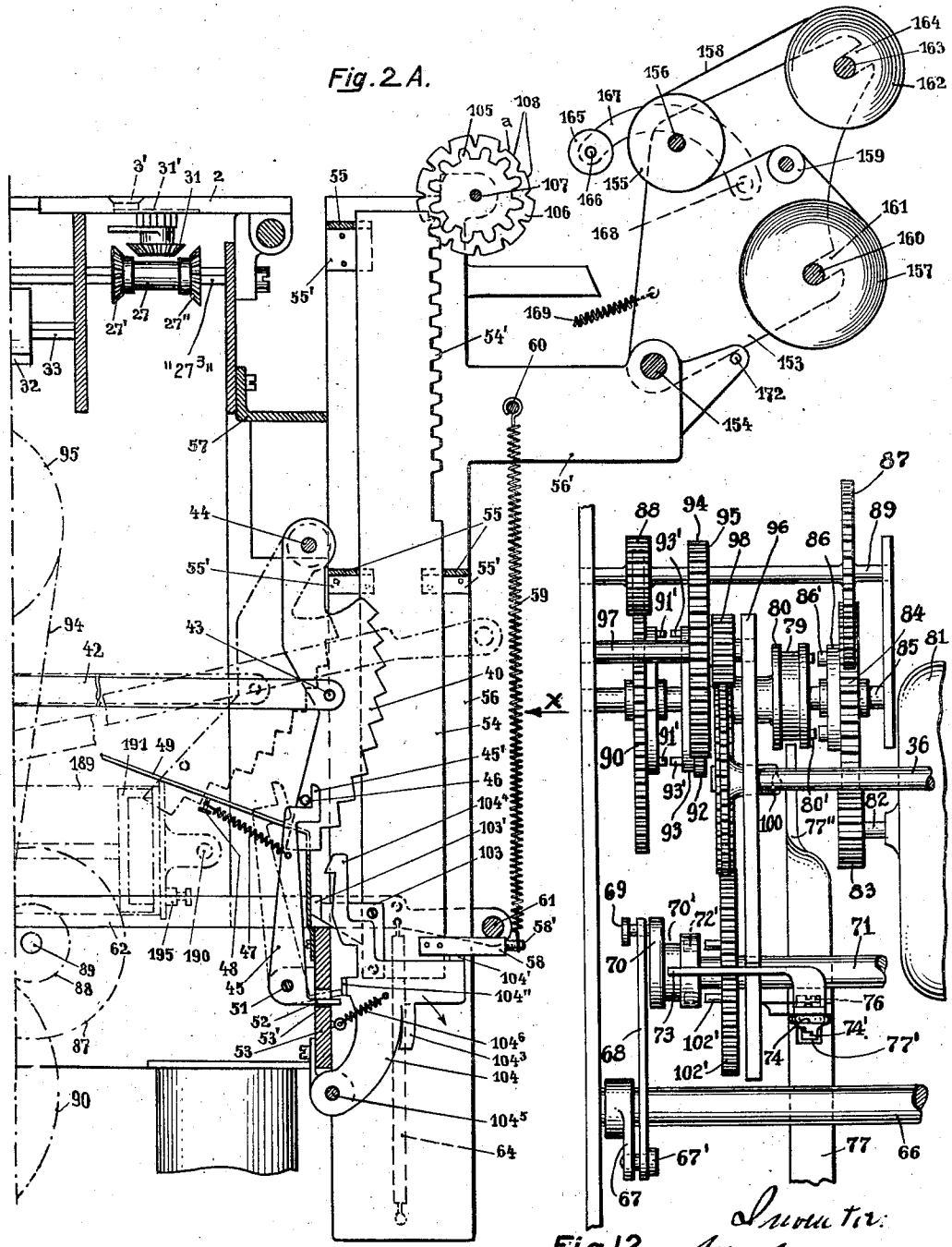


Fig. 12.

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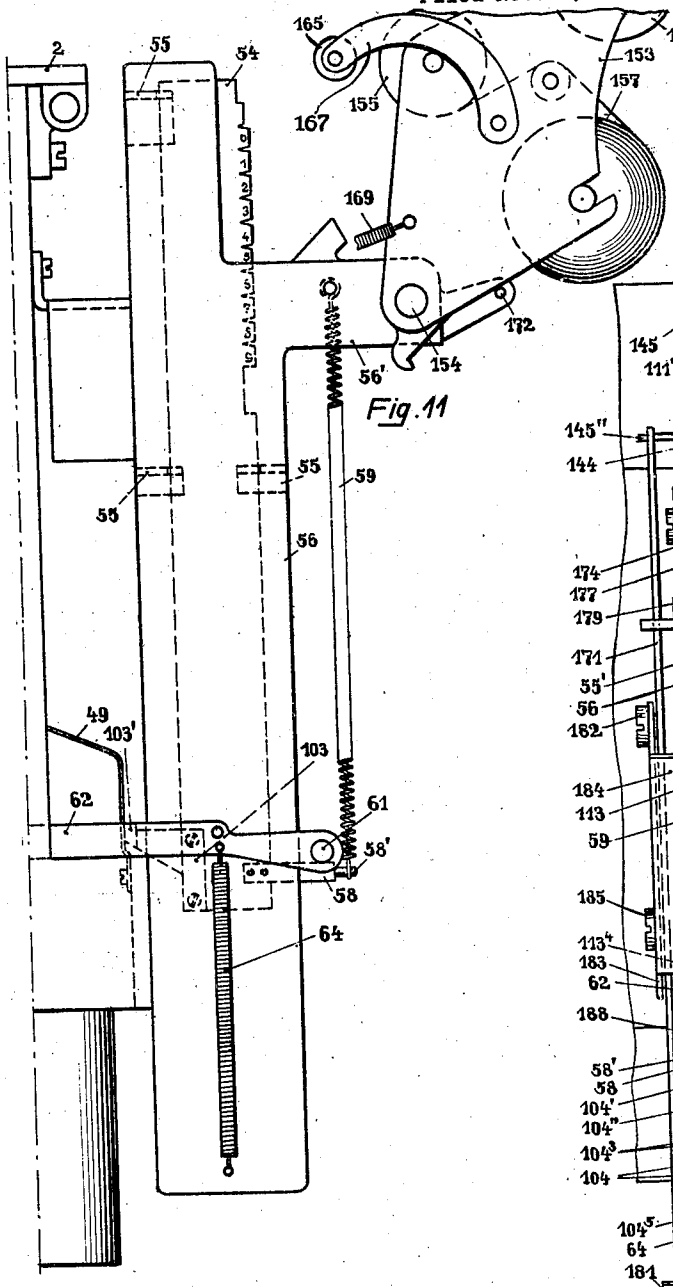
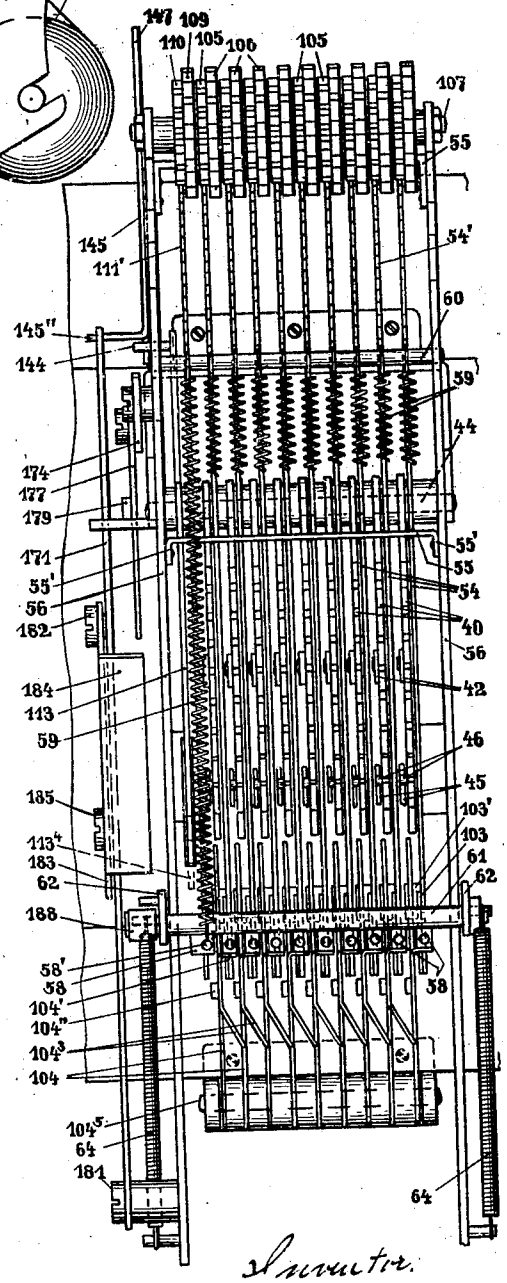


Fig.11

Fig.3



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Fig. 4

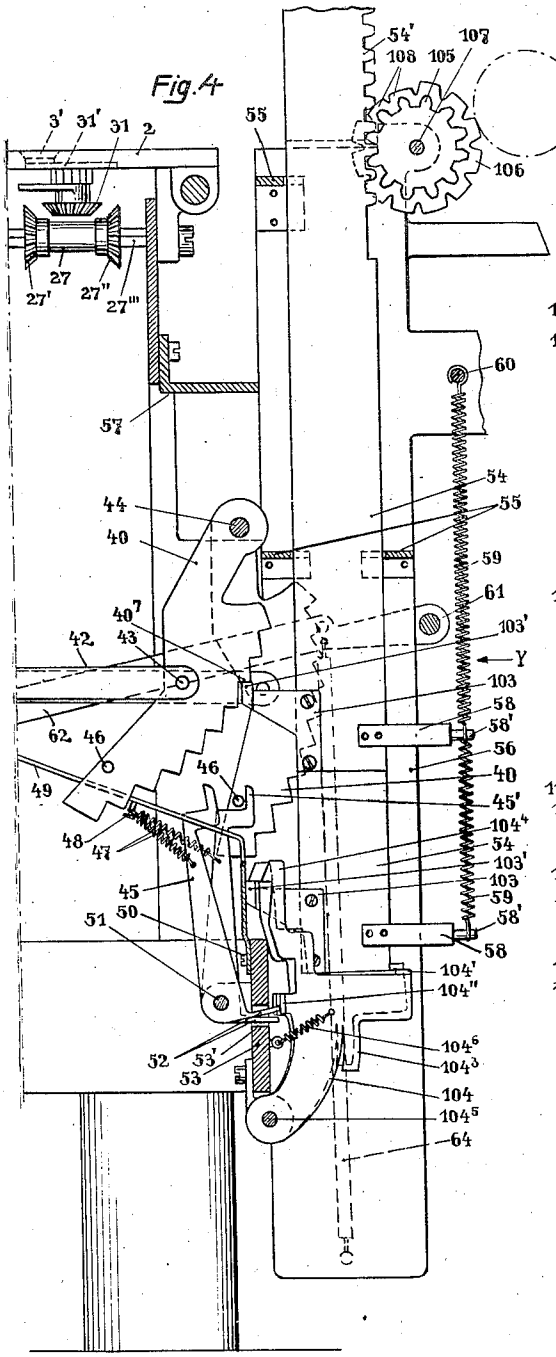
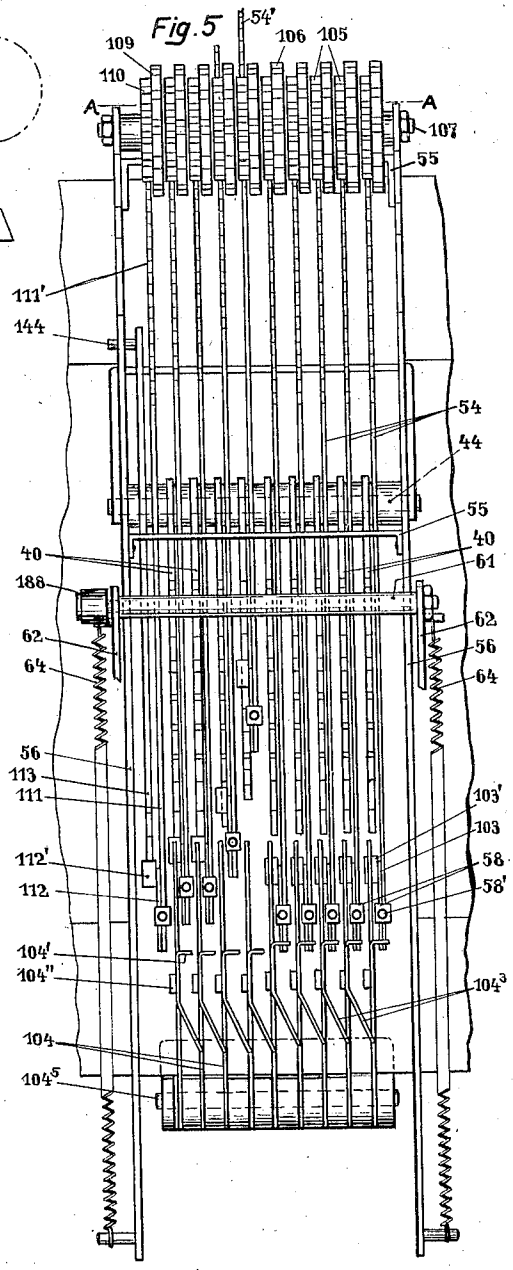


Fig. 5



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Fig. 8

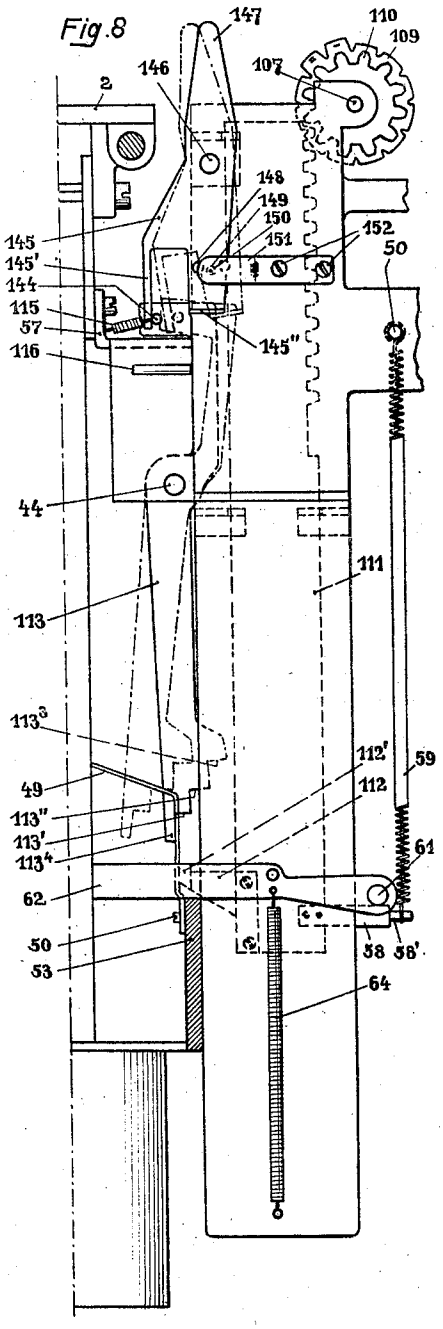
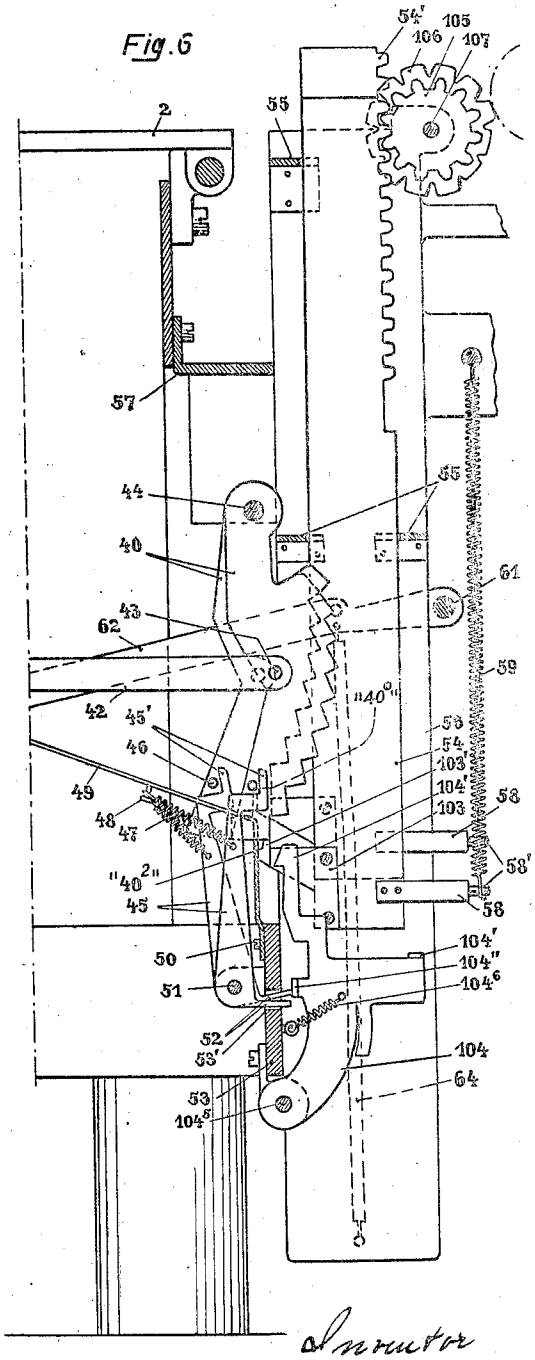


Fig. 6



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Fig. 7

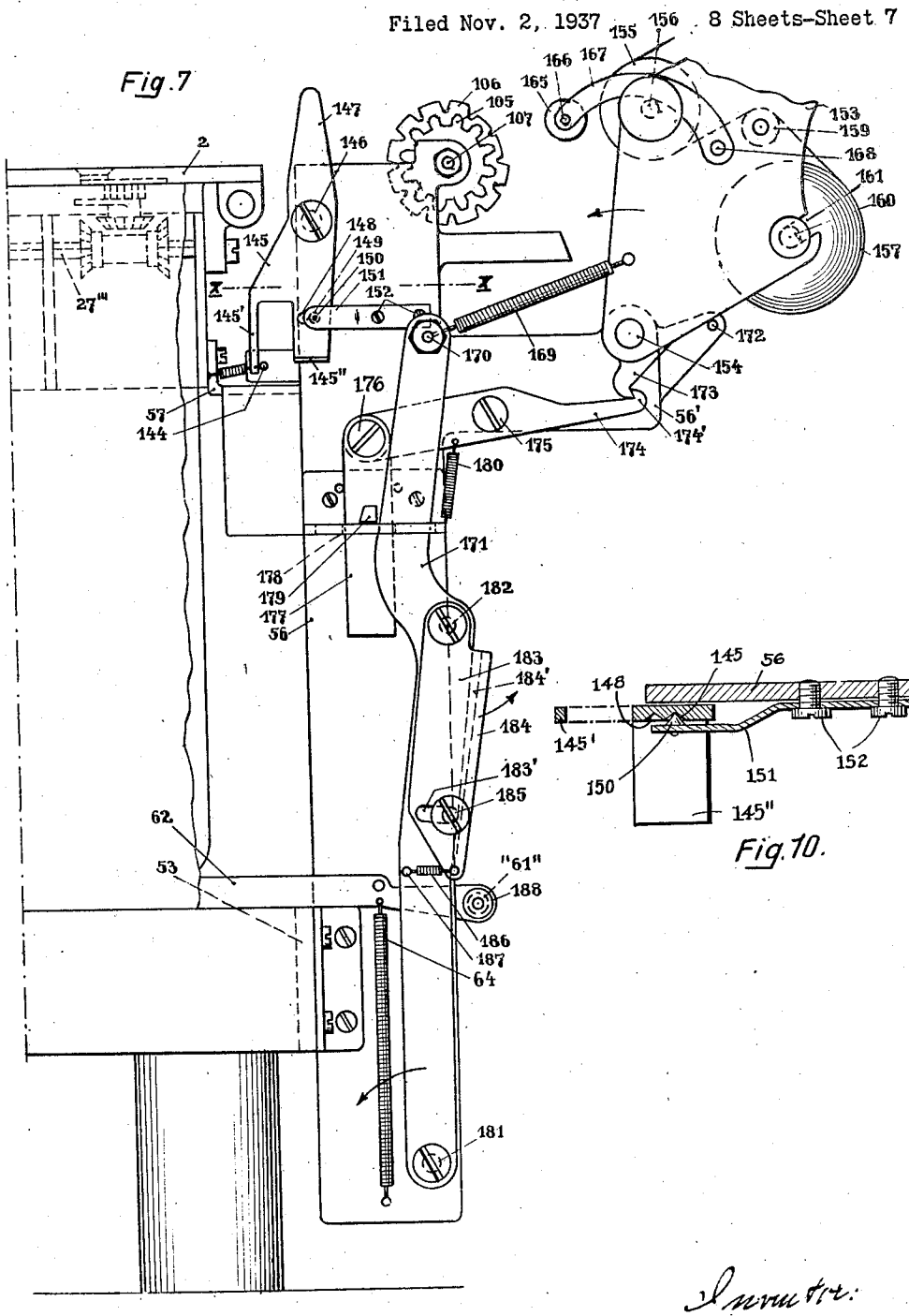


Fig. 10.

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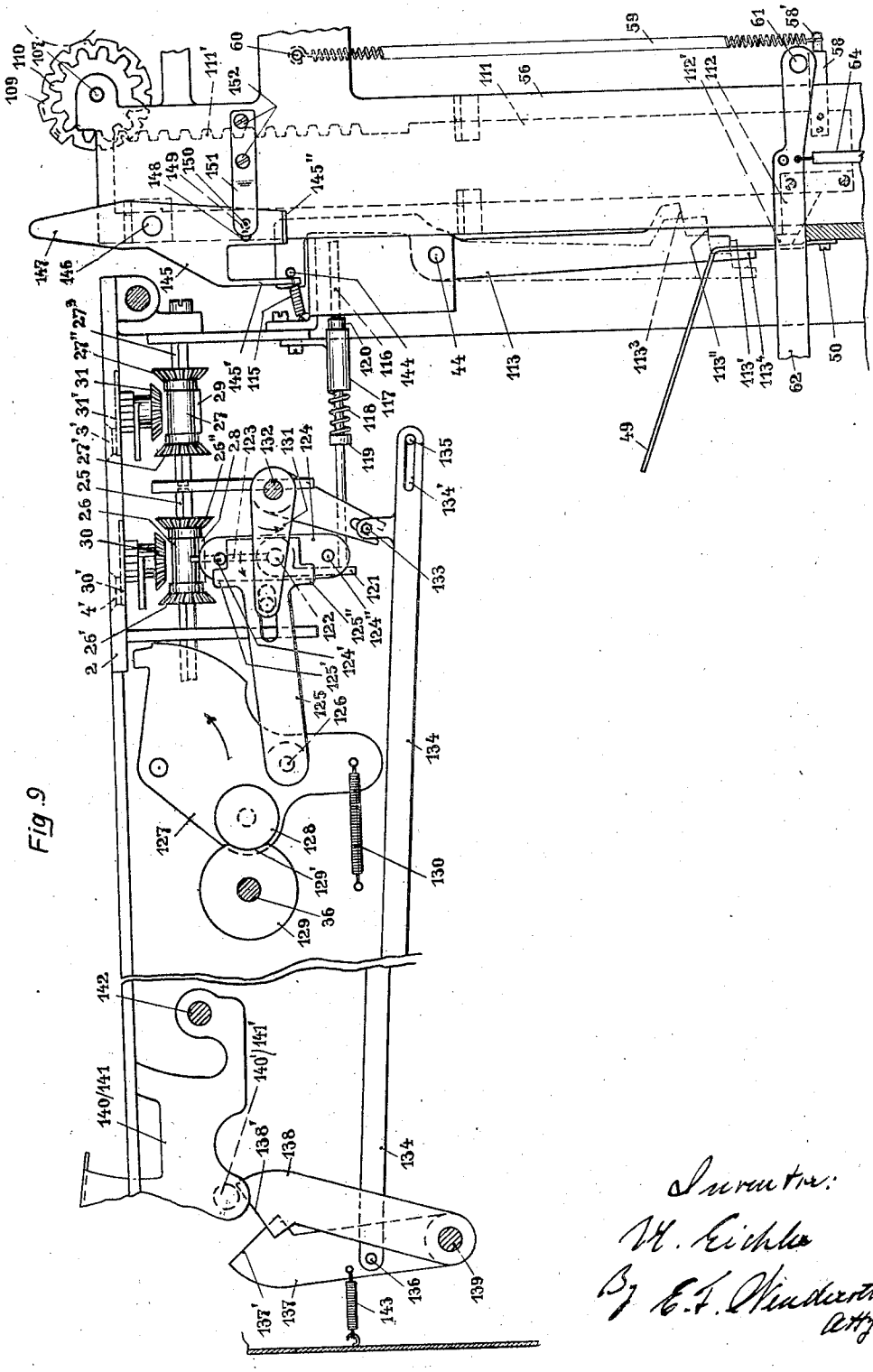


Fig. 9

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2,340,261

UNITED STATES PATENT OFFICE

2,340,261

CALCULATING AND REGISTERING MACHINE

Ulrich Eichler, Glashutte, Germany; vested in the Alien Property Custodian

Application November 2, 1937, Serial No. 172,446
In Germany August 17, 1936

3 Claims. (Cl. 235—62)

This invention relates to a new and improved calculating machine having a built-in registering or recording device.

Calculating machines, especially adding machines, with a device for recording or printing the calculated amounts are known. In machines of this kind, the item set up on the keyboard is not only entered in the calculating mechanism, but is also printed or otherwise recorded.

Calculating machines capable of carrying out addition, subtraction, division and multiplication are known which are provided with a recording apparatus.

The present invention starts from this form of construction. In contrast to the devices of this kind in which not only the individual items set by the keys but also the results of the calculations are recorded, consequently requiring a total taking mechanism of very complicated constructional design, the invention is concerned with the task of recording the individual addition or subtraction items only by means of the recording device and then recording the total result at the end of the calculation by transferring the total result to the key board and again introducing it into the calculating mechanism subtractively. This results in clearing the totalizer with simultaneous recording of the total result.

The entire construction is simplified as a matter of course by this device. According to the invention, a further simplification is attained by making use of one and the same motor drive or hand drive for the calculating mechanism and the recording mechanism. The recording mechanism is coupled to or disengaged from the drive of the calculating mechanism by means of a shift lever. A gearing may also be interposed when recording in order to reduce the present customary high speed of the drive shaft when calculating only.

It is advisable to provide a hand lever by means of which the shaft activating the recording device may be coupled to or disengaged from the main calculating shaft. In this way it is possible to combine the recording device with the setting keyboard under the control of a single handle so that, during the transfer of the keyed or set amount to the totalizer, the amount is simultaneously printed or recorded on the paper tape.

When there is present a reducing gearing that reduces the operating speed of the machine during recording, it is an object of the invention to likewise operate by the said hand lever the couplings for the connection and disconnection of this reduction gearing.

When the type rollers are set by slidable members that cooperate with stepped setting members which are in connection with the keys of the keyboard, it is an object of the invention to give the stepped setting members the form of rocking levers. This presents the advantage of sure guidance with the simplest constructional means.

Furthermore it is an object of the invention to provide an arrangement whereby the type is securely attached to type rollers or the like and to provide such type rollers with one or more blank type spaces in addition to the ten type from "0" to "9."

It is a further object to provide means to maintain the type wheels corresponding with those denominations higher than the digit of highest significant value of the actual amount, in such a position that they present their blank types opposite the recording or platen cylinder, and to present their "0" types to the platen in those denominations of the amount wherein no keys have been depressed.

With the above and other objects in view which will become apparent from the detailed description below the invention resides in the combination and arrangement of elements hereinafter set forth in detail, claimed in the claims and shown in the drawings in which:

Fig. 1 shows a top view of a preferred embodiment of the invention.

Fig. 2 shows a vertical cross section taken along the section line II—II of Fig. 1.

Fig. 2A is a continuation of Fig. 2.

Fig. 3 is a rear view of the printing wheels and their controls viewed in the direction of the arrow *x*, Fig. 2, with the paper roll apparatus omitted.

Fig. 4 shows a portion of Fig. 2 in another working position of the parts.

Fig. 5 is a rear view looking in the direction of the arrow *y* in Fig. 4.

Fig. 6 shows a vertical cross section taken along the section line VI—VI of Fig. 1.

Fig. 7 shows a fragmentary side view as seen in the direction of the arrow *z* in Fig. 1.

Fig. 8 shows a similar view as Fig. 7 but illustrating other details.

Fig. 9 shows the parts shown in Fig. 8 in a different working position, main parts of the actual calculating mechanism being included.

Fig. 10 shows a sectional view of a detail taken along the section line X—X of Fig. 7.

Fig. 11 shows a side elevational view of a modification.

Fig. 12 is an enlarged view of a portion of the lefthand side of Fig. 1, particularly the elements

shown in the broken away portion and some additional cooperating elements.

First of all the parts of the calculating machine shown in Fig. 1 will be described.

The calculating mechanism

1 indicates the keyboard which, in addition, for example, serves for the setting of the digits. The carriage 2 displaceably installed on the machine frame carries the revolutions counter 3 and the totalizer 4. 5 indicates the two carriage shift keys. The clear key is designated by 6, the quotient and division levers by 7, the addition key by 8 and the subtraction key by 9.

In the embodiment illustrated, the keyboard 1 has nine banks of keys. Each of these banks of keys comprises a plate 10 (Fig. 2) secured to the machine frame and having positioned in it nine key stems 11 that are vertically displaceable. These key stems 11 are provided with key buttons 12 that carry the figures "1" to "9." The bottom ends of the key stems 11 are guided in a plate 13 which is connected with the plate 10.

On each of the key stems 11 there is located a roller 14 which cooperates with a bar 15. The bar 15 is connected with the link 16 and the lever arm 17 in articulated parallelogram fashion. While the link 16 is pivoted to the plate 13 by means of the pin 18, the lever 17 is oscillatably mounted on the plate 13 by means of the pin 19. To the lever arm 17 there is integrally secured a lever arm 17' with the top end of which a roller 20 cooperates. The roller 20 is mounted by means of the pin 21 on an extension 22' of a slide 22. Each plate 10 is provided with a slide 22, and these slides 22 have fork-like claws 23 which set the gears 24.

The gears 24 are axially displaceable but non-rotatably mounted on the rectangular shafts 25 which carry the bevel gear mountings 26 (see Fig. 9). These bevel gear mountings 26 are longitudinally slidable but non-rotatably mounted on the shafts 25. All the mountings 26 are jointly controlled by a bar 28, and all the bevel gear mountings 27 that are similarly mounted on the shafts 27''' are controlled by a bar 29. According to whether the bars 28 and 29, as shown in Fig. 9, are displaced to the right or to the left, the bevel gears 26', 27' or 26'', 27'' engage the bevel gears 30 and 31 respectively of the totalizing mechanism and the revolutions counter mechanism. The bevel gears 30 and 31 are mounted for rotation on shafts secured on the carriage 2 and are connected with the number wheels 30' and 31' respectively.

When the bars 28 and 29 are moved to the right from the position shown in Fig. 9 so that the bevel gears 26' and 27' come into engagement with the gears 30 and 31 respectively, then the number wheels 30' and 31' are turned in a clockwise or positive direction while on movement of the bars 28 and 29 to the left from the position shown in Fig. 9, the bevel gears 26'' and 27'' are engaged with the respective gears 30 and 31, to turn the number wheels counterclockwise or in a negative direction. The number wheels 30' and 31' show through the windows 4' and 3' of the totalizing and revolutions counters. An actuator cylinder 32, as is customary in Thomas type calculating machines, is secured on a shaft 33 positioned parallel to each shaft 25 (Fig. 2). On each shaft 33 there is secured a bevel gear 34 that is in engagement with a bevel gear 35. All the bevel gears 35 of the calculating mechanism are secured on the main calculating shaft 36. The shafts 33, as is customary in the Thomas type of machines, impart step by step motion to the shafts 27''' of the revolutions counter, by means (not shown).

Operation of calculating mechanism

The arrangement and mode of operation of the device just described is such that when, for example, the "5" key (Fig. 1) is depressed, the roller 14 (Fig. 2) of the respective key stem 11 will strike against the bar 15 and tilt the lever system 16, 17 and 17' in such a way that the bar 22 is operated to set the respective gear 24 opposite that portion of the actuator cylinder 32 that has five teeth.

The key stems 11 are under the influence of tension springs (not shown) which tend to restore the depressed keys to their normal positions, as shown in Fig. 2. In the depressed position, the key stem is held by the locking or check bar 37, which is pulled to the right by means of a spring (not shown). As the key stem 11 is depressed the check bar 37 is urged to the left and when the rollers carried by the key stems 11 clear the slots in the check bar 37 such check bar will be urged to the right by the spring not shown and thereby lock the key stem 11 in depressed position. Each bar 22 has a hook-shaped plate 38 which is engaged by a tension spring 39 which is secured at the other end to a hook 40 on the plate 10. By means of this tension spring 39, the roller 20 is always held against the lever 17'.

The recorder setting mechanism

According to the invention each of the two-armed levers 17, 17' is provided with a third arm 17'' to the bottom end of which one end of a bar 42 is pivoted at 41. The other end of the bar 42 is pivoted to a stepped scroll plate 40 by means of the pin 43. As many plates 40 are provided as there are levers 17''. All the plates 40 are suspended in pendulum fashion by means of pivot pins 44 on the machine frame.

Each stepped scroll plate 40 cooperates with a lever 45, the top end 45' of which bears against a laterally projecting pin 46 provided on the plate 40. Tension springs 47 which are secured at one end by means of the pins 48 to an obtuse-angled comb plate 49 hold the levers 45 in contact with pins 46.

The comb plate 49, which is secured to the machine frame by means of screws 50 (Fig. 4), is provided with parallel guide slots for the stepped scroll plates 40. The levers 45 are pivotally mounted on the common shaft 51 which is secured to the machine frame. At their lower ends, the levers 45 are provided with rearwardly extending finger-like projections 52 which protrude through a corresponding slot 53' in the frame wall 53.

Furthermore each stepped scroll plate 40 cooperates with a rack bar 54 which is held vertically displaceable between three comb-like guides 55'' secured by means of the rectangularly bent flaps 55' between two frame plates 56 which are attached to the machine frame by means of angle pieces 57. Each rack bar has an extension 58, with the pin-like end 58' to which one end of a tension spring 59 is attached. The tension springs 59 have their other ends secured to the cross rod 60 that extends between the extensions 58' on the two frame plates 56.

The cross bar 61 of a restraining and restoring bail overlies all the extensions 58 of the spring-pressed rack bars 54, the arms 62 of the bail

extending forwardly and being fastened at their ends to a rocking shaft 63 which is mounted in the machine frame. Each of the bail arms 62 is engaged by a strong tension spring 64 (Fig. 7), which acts in opposition to the springs 59 and tends to apply the bail arms 62 against the top edge of the frame plate 53.

The bail arms 62 contact at their under edges the rollers 65' which are provided with a groove therefor and these rollers are pivoted at one of the ends of the two cranks 65. The cranks 65 are fixed on a rocking shaft 66 positioned in the machine frame. On the rocking shaft 66 there is also fixed a lever arm 67 which is pivotally connected at 67' to the rod 68 whose other end is pivoted to the crank pin 69. The crank pin 69 is secured to the crank 70, the boss 70' of which is positioned rotatably and displaceably on the shaft 71. The boss 70' of the crank 70 is provided with an annular groove 72 (see also Fig. 1) in which the shift claw 73 engages. This shift claw is secured to a lever 74 the top end of which projects upwardly above the key board plate 10 and is formed into a handle 75, the lever 74 being pivoted at 76 near the base of the machine, for rocking movement transversely of the keyboard. The bottom free end 74' of the lever 74 engages in a hole 77' of the coupling bar 77. The bar 77 is pivoted on the machine frame by means of the pin 78. The free end 77'' of the coupling bar 77 engages in the annular groove 79 of a coupling member 80 slidably keyed on the shaft 85. The extent of rocking motion of the manually operable lever 74 is restricted by the length of the transverse slot formed in the keyboard plate 10, Fig. 1, through which the upper end of the lever 74 projects.

Coupling of recording mechanism with calculating mechanism

The drive of the machine is effected by the electric motor 81, the connection and disconnection of which with the drive mechanism of the machine is effected by a contact arrangement that is activated on depressing one of the keys 5 or 8 or 9. Such an arrangement is shown in German Patent No. 457,825. On the shaft 82 of the electric motor there is fixed a spur gear 83 which meshes with a spur gear 84 freely rotatable on the shaft 85 secured in the machine frame. Connected with the spur gear 84 is a boss 86 provided with coupling claws 86' opposed to a complementary coupling 80' on the coupling member 80. In engagement with the spur gear 84 there is also a spur gear 87 which rotates a further spur gear 88 on the common drive shaft 89 rotatably mounted in the machine frame. In engagement with the spur gear 88 there is a spur gear 90 which is likewise freely rotatable on the shaft 85. Connected with this spur gear 90 there is a boss 91 provided with coupling claws 91'.

Connected with the coupling member 80, there is also a sprocket wheel 92 having a boss 93 which is provided with coupling claws 93' opposed to the coupling 91' on the face of spur wheel 90. The coupling claws 86' are in engagement with the coupling claws 80', or the coupling claws 91' with the coupling claws 93', according to whether the coupling member 80 actuated by the lever 77 is in the right hand position due to a movement of the hand lever 74 as seen in Fig. 1, or is in the left hand position. When the coupling claws 86' and 80' are in engagement, the motor shaft 82 is directly connected with the coupling member 80 via the spur gears 83 and 84. But if the coupling member is displaced to the left in Fig. 1 so that the coupling claws 91' and 93' are in engagement with each other, then the coupling member 80 is connected with the motor shaft via the connecting gearing 87—89 and the gears 83, 84 and 90.

When the coupling member 80 is engaged through gearing 87—89 there is a gear reduction of about 3 to 1 over a direct connection of the coupling member with the spur gear 84.

The sprocket wheel 92 is connected by the chain 94 with another sprocket wheel 95 which is mounted on the stub shaft 97 (Fig. 2), that is secured on the frame plate 96. Connected with the sprocket wheel 95 there is a spur gear 98 which is in engagement with the spur gear 99. The spur gear 99 is freely rotatable on the stud 100 which is likewise secured to the frame plate 96. The spur gear 101 that is located on the main calculating shaft 36 is in engagement with spur gear 99, and there is another spur gear 102 in engagement with spur gear 101. Spur gear 102 is freely rotatable on the shaft 71 and is provided with coupling claws 102'.

If, by means of the lever 74 and the shift claw 73, the boss of the crank 70 is displaced to the right in Fig. 1, then the coupling claws 102' engage in corresponding recesses 72' of the boss 70' of the crank 70, thus resulting in coupling the crank 70 with the spur wheel 102. During the necessary rocking of the lever 74 for this purpose, the lever 77 is rocked to the left, Fig. 1, by means of the pin 74'. This however brings the coupling claws 80', 86' out of engagement and the coupling claws 91', 93' will engage each other, so that the drive coupling member 80 is switched to slower speed.

Release of recording mechanism

The slot provided in the keyboard plate 10, for the handle 75 of the control lever 74 projecting therethrough, is provided with the letters S and R, respectively, at its right hand and left hand ends. These letters indicate that the machine is set for calculating alone when the handle 75 is in the left hand position, while the machine is set for simultaneous recording and calculating when the handle 75 is shifted to the right hand position.

Assuming that the handle 75 is in the last-mentioned position, then when the electric motor is set in operation, the crank 70 is also set in rotation simultaneously with the main calculating shaft 36. This rocks the shaft 66 counter-clockwise through connecting rod 68 and lever arm 67, and the shaft 66 rocks its cranks 65 counter-clockwise. The grooved rolls 65' on the cranks raise the restraining and restoring bail arms 62 into the position shown in dotted lines in Fig. 2. This results in the cross rod 61 releasing the extensions 58, so that the rack bars 54 are freed to the action of the springs 59, except for their individual latch mechanisms next explained.

Setting of type rollers

On each of the rack bars 54 there is furthermore secured a plate 103 which has a nose 103' provided at its edge. This nose extends into the plane of that stepped scroll plate 40 that pertains to the respective rack bar 54. Under each stepped scroll plate 40 there is furthermore installed a rocking latch 104 which has the form shown in Figs. 2, 4 and 6. The latches 104 are rockably positioned on the common shaft 104' which is secured to the machine frame. Each

latch 104 is engaged by a tension spring 104⁶ which tends to rock the latches 104 of Figs. 2, 4 and 6 to the left.

Furthermore, as shown in Figs. 3 and 5, each latch 104 is provided with a lateral tongue 104' bent rectangularly from the plane of the latch, which tongue extends into the range of movement of that rearward extension 58 of the corresponding rack bar 54. Thus, when the double lever 62 is in the bottom position (see Fig. 2), all the latches 104 are drawn back somewhat to the right by the extensions 58 against the pull of the springs 104⁶. In this position of the latches 104, the fingers 52 of the levers 45 swing upwards in the manner indicated by dotted lines in Fig. 2, provided of course that the levers 45 have been freed to the action of their springs 47 by the withdrawal of the stepped scroll plates 40 and their pins 46 through the depression of keys 12 in the corresponding denominations. In such case, the corresponding levers 45 are rocked counter-clockwise to locate their rearwardly projecting fingers 52 in the paths of laterally turned ears 104 formed on the latches 104, to hold the latches in their normal positions.

Furthermore, each of the latches 104 is provided with a tail 104³ which is bent off obliquely from the plane of the latch 104 in the manner shown in Figs. 3 and 5. The tails 104³ are given such a shape that their ends engage back of the adjoining latches 104 of the next higher decimal places. In this way it is contrived that when, for example as shown in Fig. 5, the fourth latch 104 from the left is prevented from swinging in by the finger 52, it also holds back the other latches located to the left of it. Say the said decimal place indicates the thousands, then the latches corresponding to the hundreds, tens and units will also be held back simultaneously.

At the top edge of each of the latches 104 there is furthermore provided a nose-like projection 104⁴ which, when the latch 104 is in its extreme left position (see Fig. 4), extends into the range of movement of the nose 103' of the corresponding rack bar 54 and prevents its upward movement.

The bars 54 are each provided with a toothed rack 54'. In engagement with each of these racks is a toothed gear 105 secured to the flank of a type roller 106. All the type wheels 106 are positioned on the common shaft 107 which has both ends secured in the frame plates 56. Here, as can be seen from Figs. 3 and 5, there are arranged alongside each other nine type wheels corresponding to the number of banks of keys. Each of the type wheels is provided with two blank spaces 108 and with ten digit types "0"–"9." These types are applied to the circumference of each type wheel in such a way that the digits, beginning with "0," are arranged counter-clockwise.

The sign recording mechanism

Referring to Figs. 3 and 5, there is installed on the left side along with the type wheels 106 still another type wheel 109 which carries the "—" sign and the "=" sign at the points indicated in Fig. 8. The type wheel 109 is connected with a toothed gear 110 which corresponds to the toothed gears 105 and is in engagement with a toothed rack 111' which is carried by a bar 111 that corresponds to the rack bars 54. The bar 111 is provided with a plate 112 which corresponds to the plates 103 and carries the nose 112'. Furthermore the rack bar 111 has also an extension 58 to which a spring 59 is connected. The nose 112' extends into the plane of a sign type selecting lever 113 which is mounted on the pivot 44. The bottom end of the lever 113 is equipped with three stepped portions 113', 113'' and 113³ and with an arresting stop 113⁴. In the position of rest of the lever 113, this arresting stop is yieldingly held by means of a tension spring 115 against the comb plate 49 which carries a guide slot for the lever 113.

Coupling of sign recording mechanism with calculating mechanism

Into the range of movement of the sign type selecting lever 113 there extends the rear end of a rod 116 (see Fig. 9) extending forwardly through a guide sleeve 117 secured to the machine frame. The forward end of the rod abuts a depending arm 121 fast on rocking shaft 122. Encircling the rod is a pressure spring 118 which bears at one end against the sleeve 117 and at the other against a ring 119 secured on the rod 116 to normally hold the rear end of the rod withdrawn from engagement with the sign type selecting lever 113, and maintain the forward end of rod in abutting relation with the depending arm 121. A collar 120 on the rear end of the rod 116 contacts the rear end of the guide sleeve 120 to limit the forward thrust of the rod 116. The rocking shaft 122 is connected by means of pins 123 with the shift bar 28 controlling the engagement of the bevel gears 26', 26'' with the totalizing wheel bevel gear 30, for addition or subtraction.

On the rocking shaft 122 there is furthermore secured a crosspiece 124 which carries the two studs 124' and 124''. With these two studs there cooperates alternately the shoulder 125' or 125'' respectively of a T-shaped pitman 125, the tail of which is pivoted at 126 to the rocker 127. On the plate 127 there is located a roller 128 which cooperates with a cam disc 129 that is positioned on the shaft 36. On one rotation of the shaft 36, the roller 128 is forced out of the recess or seat 129' in the circumference of the cam disk 129 and at the completion of such rotation, the roller 128 again seats itself in the recess 129'. The rocker 127 carrying the roller 128, therefore, is rocked counter-clockwise (Fig. 9) where it is held during the rotation of the cam disk 129 until the recess 129' of the cam disk again registers with the roller 128, whereupon the spring 130 restores the rocker to its normal position.

Coincidentally the pitman 125 is forced to the right, and as the rocker 127 restores, it withdraws the head of the pitman from the cross piece 124. As can be seen from Fig. 9, the cross piece 124 is moved clockwise or counter-clockwise according to whether the pitman 125 cooperates with the stud 124' or with the stud 124''. By means of the pins 123, the shifter bar 28 is thereby pushed either to the right or to the left.

If the shifter bar 28 is pushed to the right so that the bevel gears 26' enter into engagement with the bevel gears of the totalizer mechanism, then the coupling is set for addition, whereas, on shifting the bar to the left, the bevel gears 26'' enter into engagement with the bevel gears 30, resulting in a negative or subtractive setting of the totalizing mechanism.

The setting of the pitman 125 is effected by the double armed lever 131 which is positioned on the rocking pivot 132. The free forked end of the double armed lever 131 engages over a pin

133 on the link 134. One end of the link 134 with its slotted hole 134' engages around a guide pin 135 provided on the machine frame, while the other end is connected with a lever 137 by means of the pivot 136. The lever 137 is connected with a complementary lever 138, both levers being rockably positioned on the pivot 139 provided on the machine frame. Cam surfaces 137' and 138' are provided at the ends of the complementary levers 137 and 138.

Above the levers 137 and 138, the add and subtract key levers 140 and 141 which carry the keys 8 and 9 are pivotally mounted at 142. On the key lever 140 which carries the key 8 there is provided a stud 140' which extends into the plane of the cam surface 137'. On the lever 141 which carries the "—" key there is installed the stud 141' which extends into the plane of the cam surface 138'. The construction and operative functions of the state control—levers 137 and 138 are disclosed in my co-pending application, Serial No. 117,952, filed December 28, 1936, patented September 17, 1940, No. 2,215,263.

Operation of sign recording mechanism

When the "—" key 9 is depressed, the stud 141' wipes along the inclined surface 138' as the subtraction key lever 141 rocks downwardly. Thereupon the complementary levers 138 and 137, as shown in Fig. 9, are rocked to the right against the pull of the spring 143. By this rocking of the lever, the link 134 is pushed to the right and the double arm lever 131 is tilted in the direction of the arrow in Fig. 9. The pitman 125 is thereby moved downwardly to such an extent that its shoulder 125'' lies in front of the stud 124''.

Owing to the rearward pushing movement of the pitman 125 produced on rotation of the main shaft 36, the cross piece 124 is turned counter-clockwise in the direction of the arrow in Fig. 9, so that the shifter bar 28 moves the corresponding gear mountings 26, as shown in Fig. 9, to the left and the bevel gears 26'' come into engagement with the totalizer mechanism bevel gears 30. During this movement of the cross piece 124, the rod 116 is, by means of the depending arm 121, displaced to such an extent to the right against the pressure of the spring 118, as shown in Fig. 9, that the sign type selecting lever 113 is moved into the position shown in dotted lines in Fig. 9 in which the stepped portion 113'' is positioned within the range of movement of the nose 112' of the rack bar 111 of the sign printing type wheel.

Furthermore there is secured to the sign selecting lever 113 a pin 144 which lies in the path of movement of a beak 145', on a lever 145 that is pivoted on the machine frame at 146 and is provided with a handle 147. The lever 145 is equipped with two indentations 148 and 149 with which a spur 150 cooperates. This spur 150 is mounted on a spring 151 that is secured to one of the frame plates 56 by means of the screws 152.

If the lever 145 is moved by means of the handle 147 into the dotted line position shown in Fig. 8 so that the nose or spur 150 of the spring enters the groove 148, then the sign selecting lever 113 is simultaneously brought, against the pull of the spring 115, into the dotted line position shown in Fig. 8. The step 113^3 is thereby brought within the range of movement of the nose 112' of the rack bar 111 for the sign printing type wheel.

The printing apparatus

The printing apparatus cooperating with the type wheels 106 and 109 consists of two parallel plates 153 which are positioned by means of the trunnion 154 on the two projections 56' of the frame plates 56. The platen cylinder 155 is positioned on the interconnected plates 153 by means of the shaft 156. The paper tape 158 coming from the reel 157 is led over this printing cylinder, a guide roll 159 being inserted between the reel 157 and the cylinder 155. The axle 160 of the reel 157 is located in easily exchangeable position in corresponding slots 161 in the plates 153.

The tape coming from the platen cylinder 155 is wound on the winding reel 162, the axle 163 of which is likewise located in easily exchangeable position in two slots 164 in the plates 153. In front of the platen cylinder 155 there is installed the inking roller 165, the shaft 166 of which is carried at the ends of two spaced levers 167. The other ends of the levers 167 are secured on a shaft 168 which is positioned in the plates 153. One of the plates 153 is engaged by one end of a tension spring 169 and the other end of the spring is secured to the end of a lever 171 (Fig. 7) by means of the bolt 170.

Normally, the plates 153 rest against pins 172 which are installed on the projections or extensions 56'. On one of the plates 153 there is secured a hooked projection 173 which cooperates with the nose 174' provided on a locking lever 174 which is mounted on the frame projection 56' by means of the pivot 175. A vertically depending guide bar 177 is pivoted at the free end of the lever 174 at 176 and this bar is held in guide slot 178 formed in the horizontal flange of a bracket 176^a attached to the inner face of the left hand frame plate 56. The depending guide bar 177 is provided with a stop 179. A tension spring 180 engaging with the lever 174 tends to hold the lever 174 in the position shown in Fig. 7 with the stop nose 179 in contact with the horizontal flange.

A printer-actuating lever 171 is mounted on one of the frame plates 56 by means of the pivot 181. By means of the pivot 182 there is secured to the lever 171 an adjustable plate 183 which is flanged along one longitudinal edge, as at 184, to provide a cam path. The plate 183 is provided with a slot 183' through which there engages a bolt 185 that is secured to the lever 171. With the bottom end of the plate 183 there engages a tension spring 186, the other end of which is secured at 187 to the lever 171. This spring 186 tends to hold the plate 183 in the position shown in Fig. 7 and the slot 183' permits the plate 183 to swing rearwardly against the pull of the spring 186 in the direction of the arrow in Fig. 7. A roller 188 positioned on the bail 61 traverses the cam path 184 to rock the printer lever 171.

General operation

The mode of operation can be explained by means of an example in calculation. It is assumed that the following numbers are to be added

7,200
3,175

As the numbers to be added are to be recorded also, the handle 75 (Figs. 1 and 2) must first be set to the position indicated by S in Fig. 1. By this setting of the hand lever, the boss 72 of the crank 70 is slid to the right (Fig. 1) on the shaft 71 to fit the recesses 72' of the bars 72

of the crank 70 over the coupling claws 102' of the spur wheel 102, and the crank 70 is consequently coupled with the spur wheel 102. The lever 77 is simultaneously shifted in the previously described manner to connect the intermediate gearing 87—90 with the drive so that the main calculating drive shaft 36, when the electric motor is operated, only makes about one third the speed of rotation made when the drive is direct.

To clarify the decription of the operation up to this point, it will be understood from the foregoing that the motor 81 (Fig. 2) is of the intermittent type, the flow of current from any suitable source being controlled by either the "add" or "subtract" keys 8 or 9 (Fig. 1), respectively.

Also that the control lever 75, 74 (Fig. 2) for determining whether the machine shall calculate only, or shall calculate and print, is normally in its intermediate position in the slot in the key board.

The motor 81 drives its motor shaft 82 which carries the drive pinion 83 in constant mesh with a larger gear 84 journaled on the drive shaft 85. The drive member 86 of a clutch is mounted on one face of the gear 84.

A co-acting coupling member 80 (Fig. 1) is splined on the drive shaft 85, that end of the coupling member adjacent and opposed to the clutch member 86 having a drive clutch face 80' formed thereon to engage with the driving clutch face 86'. The hand lever 75, 74 controls the engagement and disengagement of the clutch face 80' relatively to the driving clutch face 86'.

Obviously, when the clutch faces are engaged, the power from the motor is transmitted directly to the drive shaft 85, through pinion 83, gear 84, and clutch faces 86', 80'.

The sprocket wheel 92 fast on the extended hub of the coupling member 80, through its sprocket chain 94, drives a sprocket 95 journaled on a stub shaft 97 and having a pinion 98 fast thereon in constant mesh with a gear 99 journaled on a stub shaft 100.

Gear 99 meshes with a totalizer driving gear 101 fast on the main calculator drive shaft 36, and the driving gear 101 in turn meshes with a gear 71 journaled on the stub shaft 71 and having a clutch face 102'.

The sprocket 92 of the coupling member 80, therefore, is in driving connection with the calculating drive shaft 36 at all times, and actuates the calculating drive shaft at high speed when the control lever 75, 74 is rocked to the left from its normal intermediate position, to that end of its slot marked "R."

Obviously, when the control lever 75, 74 is in its intermediate position, the coupling member 80 is disengaged from its high speed coacting clutch member 86' and no motion is imparted to the calculating mechanism drive shaft 36.

The manually operable control lever 75, 74 connects directly (Fig. 2) with the shift lever 77 at the base of the machine, the rear end of which shift lever engages the axially shiftable coupling member 80, whereby to enable the control lever to shift the coupling member.

This manually operable control lever 75, 74 also determines the operation of the printer, to which end, it is directly connected by a forked arm 73 with the hub of a crank 70, the hub being axially slidable along the stub shaft 71 and having a clutch face 70' engageable with and disengageable from a complementary clutch face 102' of the gear 102 driven from the sprocket 92 of the coupling member 80, from which the power is derived.

A link 68 connects the crank arm 70 with an arm 67 fast on the shaft 66 to which shaft is also fast the parallel arms 65 provided with the rollers 65' for operating the printer restraining bail 62, 61.

So long as the restraining and restoring bail 62, 61 remains in its lowered position, shown in full lines in Figs. 2 and 2a, under the influence of its strong springs 64, no printing can occur, notwithstanding the retention of individual rack bar latches 104 in idle position by the check levers 45 when depression of numeral keys 12 has withdrawn the stepped scroll plates 40 clockwise to their corresponding differential positions.

Because the printing operation requires more time to complete than does a calculating operation, it is necessary, when listing the items set up on the key board as well as adding them, to abandon the use of the high speed direct connection between the motor and the coupling member 80, substituting therefor a reduced speed drive for the calculating mechanism drive shaft 36.

To this end, the countershaft 89 (Figs. 1, 2 and 2a) on which the gear 87 is fast, also carries a pinion 88 spaced apart from the gear 87 and fast on the shaft.

This pinion is in mesh with a large reduction gear 90 journaled on the shaft 85 and provided with a clutch face 91, 91' opposed to a co-acting clutch face 93, 93' formed on the outer flank of the sprocket wheel 92, which it will be remembered is connected with and forms part of the coupling member 80 axially slidable along, and splined to the shaft 85.

By shifting the control lever 75, 74 clockwise (to the right, Fig. 1) the coupling member 80 shifts to the left to engage the clutch face 93, 93' with the clutch face 91, 91' on the reduction gear 90, so that the power is now led from the motor shaft 82, and through drive pinion 83, loose gear 84, counter gear 87, counter shaft 89, counter-pinion 88, reduction gear 90 and clutch faces 91, 93 to the sprocket wheel 92, and thence, via sprocket chain 94, sprocket wheel 95, and gears 99 and 101 to the main calculating mechanism drive shaft 36, through the operation of which the amount indexed on the key board is entered in the calculating wheels 31'.

This shifting of the control lever 75, 74 to the "S" position at the right of the slot in the key board also results in drawing its forked arm 73 along, and with it the crank arm 70 slidably along stub shaft 71, to engage the clutch face 72' on the hub of the crank arm with the clutch face 102' on the gear 102 of shaft 73. The crank pin 69 connecting the crank 70 and link 68 is of sufficient length (Fig. 1) to permit axial movement of the crank relatively to the link.

It will be understood that with the control lever 75, 74 in both its intermediate and in its left hand positions, the clutch faces 72' and 102' are disengaged.

Engagement of the clutch faces 72' and 102' enables the transmission of motor power from the gear 102 to the crank arm 70, which operates through the link 68, and arm 67 to rock the shaft 66 with its arms 65, which latter thereupon rock the restraining and restoring bail 62, 61 upwardly to release such of the printer rack bars 54 as are free to move, to the actions of their individual springs 59.

The printer rack bars 54 differentially turn the

printer wheels 106 to represent the item set up on the key board, after which the restraining and restoring bail, as it approaches the limit of its upward travel, operates the rocking frame supporting the platen 155 to cause the latter to strike the differentially positioned types.

Now "7,200" is indexed on the keyboard, and this is done by depressing the "7" in the fourth bank of keys from the right and the "2" in the third bank of keys from the right. By depressing the "7" in the fourth bank of keys from the right, the respective levers 15, 16, 17, 17' are brought into the position shown in dotted lines in Fig. 2. At the same time, by means of the extension 17'' and the bar 42, the corresponding stepped scroll plate 40 is rocked into the position shown in dotted lines in Fig. 2A. Also the associated gear-adjusting slide 22 is displaced by means of the lever arm 17' in such a way that the corresponding actuator cylinder gear 24 is set opposite that point of the actuator cylinder 32 that has seven teeth.

In this position of the plate 40 (see position in Fig. 4) the tooth 40^7 will cooperate with the nose 103'. On the movement of the stepped scroll plate 40 into the position as shown in Fig. 4, the pin 46 releases the corresponding blocking 45 so that it can take up the position shown in dotted lines in Fig. 2A or the position shown in Fig. 4. The finger-like extension 52 belonging thereto is thereby moved into the path of the angular offset 104'' of the latch 104.

The stepped scroll plate 40 belonging to the third bank of keys from the right is moved into the position shown in dotted lines in Fig. 6, so that the step indicated by 40^2 enters into the path of the nose 103' of the associated rack bar 54. In this case also the respective blocking lever 45 is released by the pin 46 so that the corresponding finger 52 moves in front of the rectangular stop 104'' of the cooperating latch 104.

All the other blocking levers 45 remain in their effective initial positions because only the two keys mentioned have been depressed.

If now the "+" key 8 is depressed, then the corresponding lever 140 is moved downwardly with the respective pin 140' impinging against the cam surface 137' and the levers 137 and 138 are moved into the positions shown in Fig. 9, provided they have not already occupied such positions. Furthermore, by means of the rod 134, the pitman 125 is also set in the position shown in Fig. 9 provided it has not already occupied this position, so that the shoulder 125' is located in front of the stud 124'.

Through the downward movement of the key lever 140, the electric motor is started by means of a rod connection (not shown in the drawings) in such a way that the calculating drive shaft 36 executes one rotation. During this rotation, the shaft 122 is first of all rocked clockwise by means of the pitman 125 so that the shifter bar 28 couples the bevel gears 26' with the bevel gears 30 of the totalizer mechanism for addition after which the item set up on the key board is registered in the totalizer mechanism by means of the actuator cylinders 32, so that in the present case the amount "7,200" appears therein on termination of the rotation of the calculating drive shaft 36.

Simultaneously with the calculating drive shaft 36, the crank 70 also makes a rotation being driven by the spur gears 101 and 102. This permits the arms of the restraining and restoring bail 61, lever 62, to execute an upward and downward movement due to the movement of the linkage 68, 67, 66, and 65, and to the return springs 64.

On the upward movement of the arms of the restraining and restoring bail 61, lever 62, the bail cross rod 61 releases all the projections 58 of the printer rack bars 54 so that the printer rack bars are subjected to the action of the springs 59 which tend to move the rack bars 54 upwardly as far as possible. On the upward movement of the rack bars, the projections 58 release the laterally off set lugs 104' that are provided on the latches 104, so that the latches 104 are freed to the action of the springs 104^6. The latches 104 belonging to the five extreme left banks of keys thereby move into the extreme left positions shown in Fig. 4, so that the noses 104^4 enter the paths of movement of the stops or noses 103' that are mounted on the rack bars 54.

The rack bars 54 belonging to the five extreme left banks of keys can only move upwardly one step until the noses 103' on the rack bars 54 contact the hook-like portions 104^4 on the latches 104.

It must here be pointed out that in Figs. 3 and 5 these five bars are located on the right side because these figures are rear views. The said five rack bars move one step upwardly to locate the blank space 108 that is positioned next to the "0" type opposite the printing line of the platen cylinder 155.

On the other hand, the rack bar 54 that belongs to the fourth bank of keys moves upwardly into the position shown in Fig. 4, because the latch 104 belonging to this rack bar is held by the finger 52 in the rearward position shown in Fig. 4. The respective type wheel is therefore turned to position the type "7" to be printed when the platen cylinder assumes the position shown in dotted lines in Fig. 4 at the time of printing.

The rack bar 54 pertaining to the third bank of keys moves upwardly until the nose 103' impinges against the step 40^2 of the corresponding plate 40, shown in Fig. 6, to rotate the corresponding type wheel to position the type "2" opposite the platen cylinder 155. The latch 104 pertaining to this rack bar 54 is also prevented from swinging in by the finger 52, so that the nose 103' of the rack bar 54 can pass by the hooked projection 104^4 of the latch.

As regards the latches located to the left of the last named latch 104, as seen in Fig. 5, and which belong to the toothed racks or bars 54 of the second and first banks of keys, these have their oblique cross-over tails 104^3 engaging in back of each other and of the latch of the third bank of keys. These two latches are held back in the position shown in Fig. 6 so that their noses 104^4 lie outside the paths of movement of the noses 103' of the corresponding rack bars 54. This means however that the rack bar 54 pertaining to the two extreme right hand banks of keys can move upwardly into the positions shown in Fig. 6 in which the noses 103' contact against the bottom steps 40^0, of their respective stepped scroll plates 40 to turn the two corresponding type wheels to such an extent that the types "0" are set opposite the platen cylinder 155.

On the raising of the restraining and restoring bail 61, 62, the individual rack bars 54 accordingly take up the positions shown in Fig. 5, with the types indicated in position. The line A—A in Fig. 5 indicates the line of types that are set opposite the platen cylinder. The type wheels corresponding to the five extreme left banks of keys now have their "blank" types lo-

cated at the printing point, the fourth and third type wheels from the right, present a "7" and a "2," respectively, to the platen, and the second and first type wheels each present a "0" to the platen.

As regards the sign type rack bar 111 it is to be noted that, as the sign selecting lever 113 remains in the initial position as shown in Fig. 8, the sign type rack bar 111 moves upwardly until the nose 112' engages with the step 113' to turn the corresponding type wheel 109 to present a blank space opposite the platen cylinder 155. A "+" sign can also of course be inserted at the corresponding point of the type wheel.

Printing operation for first item

On the upward movement of the restraining and restoring bail 61, 62, the roller 188 on the cross bar 61 (Figs. 3 and 7), wipes along the cam path 184 to rock the lever 171 counter-clockwise in the direction of the lowermost arrow in Fig. 7, which tensions the printer spring 169. The platen 155 and associated mechanism is, however, prevented by the hooked nose 174' from joining in the counter-clockwise movement. It is only shortly before the restraining and restoring bail 61, 62 reaches its topmost position that one of the arms 62 engages with the sliding bar 177 and the lever 174 is thereby rocked against the pull of the spring 180 to cause its hooked nose 174' to release the projection 173 whereupon the platen 155 and associated mechanism is moved in the direction of the uppermost arrow shown in Fig. 7 toward the type on the type wheels. Thereupon the ink supply roller 165 first rolls over and inks the type in the printing position, and the platen cylinder 155 then presses the paper tape 158 against the type.

In the topmost position of the bail 61, 62, the roller 188 passes beyond the range of the cam surface 184, so that the printer lever 171 is released. The platen and associated mechanism can now drop back under its own weight into the initial position shown in Fig. 7, thereby bringing back the printer lever 171 into the initial position shown in Fig. 7. On downward movement of the bail 61, 62, the roller 188 rolls upon the inner edge 184' of the cam surface 184, thereby occasioning a rocking of the cam plate 183 against the pull of the spring 186. Finally, the roller 188 again releases the cam plate 183 when the bail 61, 62 has almost reached its lowermost position.

Operation for addition of second item

After the amount "7,200" has been entered on the totalizing mechanism and also printed on the paper tape 158, the next number to be added "3,175" is introduced into the keyboard. By depressing the corresponding keys, the respective stepped scroll plates 40 are given the corresponding settings by the links 42, so that on depressing the addition key 8, the amount is printed on the paper tape at the same time that it is registered in the totalizing mechanism.

The result "10,375" that now appears in the totalizing mechanism is now transferred into the keyboard and this can be done by hand, if necessary, by any of the known back transfer devices.

Transfer of result

Hereupon the hand lever 147 is brought into the position shown in dotted lines in Fig. 8 so that the sign type selecting lever 113 coupled thereto takes up the position shown in dotted lines in Fig. 8. Now the subtraction key 9, Figs. 1 and 9, is manipulated in order to clear the amount from the totalizing mechanism simultaneously with the printing of the result on the paper tape.

When the subtraction key 9 is depressed, the pin 141' engages with the cam surface 138' when the key lever 141 moves downwardly and the levers 137, 138 are thereby rocked to the right from the position shown in Fig. 9. This results in rocking the pitman 125 clockwise, so that upon the ensuing cycle of the machine, the pitman will displace the bevel gear mountings 26 to their "Subtract" positions, so that the bevel gears 26'' engage with the bevel gears 30 of the totalizer mechanism. For setting the electric motor into operation there is the same mechanism for the subtract key as for the add key.

On the rotation of the main shaft 36 that is thereby produced, the amount set up on the keyboard is subtracted from the like amount appearing in the totalizer mechanism, and this results in clearing the totalizer. The corresponding setting of the type wheels takes place at the same time, so that the result is printed on the paper tape during the oscillating movement of the platen cylinder.

As the sign type selecting lever 113 has been brought as above mentioned into the dotted line position shown in Fig. 8, the cooperating sign type carrying bar 111 can move upwardly on upward movement of the restraining and restoring bail 61, 62 until the nose 112' contacts the step 113³. This results in the respective type wheel being turned so that the "=" sign is set opposite the platen cylinder. The "=" sign consequently appears opposite the result transferred to the paper tape, so that the calculation as printed on the paper tape looks like this:

7 200
3 175
10 375 =

In order that the sign type selecting hand lever 147 may not have to be specially brought back to the initial position when there are further addition calculations to be made, the lever 145 is provided with a rectangular flange 145'', Fig. 7, that extends into the path of oscillation of the printer lever 171. When, on upward movement of the restraining and restoring bail 61, 62, the printer lever 171 is rocked to the left as shown in Fig. 7, it impinges against the extension 145'' at the end of this counter-clockwise movement and restores the hand lever into the initial position as shown in Fig. 7 and the spring actuated nose 150 thereby snaps into the seat 149. The pin 144 is also released together with the sign type selecting lever 113, so that this lever is now subjected to the action of the spring 115. As soon as the rack bar 111 is again moved into the initial position on the return movement of the double armed lever 62 into its initial position, the nose 112' releases the bottom part of the lever 113 so that this can now swing back into the initial position as shown in Fig. 8.

Recording subtraction items

In order to identify any subtract items of a calculation perceptible on the paper tape, the device 116—121, Fig. 9, is provided. On manipulation of the shift bar 28 in the subtractive direction, i. e., on its displacement to the left as shown in Fig. 9, the sign type selecting lever 113 is adjusted by the depending arm 121 and the rod 116 so that the step 113'' of the sign type selecting lever is brought into the range of movement

of the nose 112'. On the upward movement of the bail 61, 62, the rack bar 111 can move upwardly until the nose 112' impinges against the step 113''. In this case, the corresponding type wheel 109 is moved so that the type provided with the "—" sign comes in front of the platen cylinder 155. If, for example, "888" has been deducted in a calculation, this is recorded on the paper tape as follows:

888 —

It must also be noted that, instead of the type wheels provided, the type can also be mounted directly on the type bars 54, as indicated in Fig. 11. In this case, the platen and associated mechanism would accordingly cooperate directly with the bars 54 which carry the type "0"–"9."

In the embodiment shown in the drawings, the type wheels used have twelve spaces. It is, of course, sufficient to make the type wheels with eleven spaces, in which case the one blank type would have to take up the initial position indicated in Fig. 2a by *a*. Of course the tooth relation between the racks 54 and the spur gears 105 would have to be arranged in such a way that when, for example, the nose 103' impinges against the top step of the stepped scroll plate 40, the respective type wheel positions the type "9" opposite the platen cylinder.

Release of recording mechanism

If calculations are to be made on the machine without the keyed amounts being printed, then it is only necessary to move the clutch controlling hand lever 75 to the left until it comes in front of the letter R. The intermediate gearing 87—89 is thereby disconnected and the electric motor is coupled to drive the calculating drive shaft 36 of the calculating machine more rapidly. The coupling 72', 102' is also released at the same time, so that the crank 70 remains in the position of rest during the rotations of the main calculating shaft 36.

Damping mechanism

In order to compensate to some extent for the irregular loads imposed upon the machine drive, there is provided an air damper which consists of a dash pot 189 (Figs. 2 and 2A) pivotally positioned on the machine frame at 190. In this dash pot there is installed the piston 191 whose piston rod 192 is pivoted at 193 to an arm 194 fast on the shaft 66 that is located in the machine frame. The air pressure in the chamber formed between the end wall of the dash pot and the face of the piston is controlled by an adjustable valve 195. On the movement of the piston rod 192 to the left, as seen in Fig. 2, which takes place on the lifting of the bail 61, 62, the piston moves freely. On the downward movement of the bail 61, 62, which causes a movement of the piston rod 192 to the right, however, the air cushion in front of the piston comes into action and it is possible to adjust the outlet valve 195 according to the amount of damping desired.

Recording of multiplication or division calculations

Of course multiplication or division calculations may also be registered or recorded with the new device.

In this case, one may proceed as follows:

With the clutch control lever 75 in its right hand position, the multiplier is set up on the keyboard and is recorded by manipulation of the "Add" key 8, after which the multiplicand is set up on the keyboard and likewise set down on paper by manipulation of the add key. Thereupon the hand lever 75 is shifted to R and the set multiplicand retained set up on the keyboard. After the totalizing and revolutions counter mechanisms have been cleared, the set multiplicand can be multiplied by the previously written down amount of the multiplier by corresponding manipulation of the add key. The result that appears in the totalizing mechanism is transferred to the keyboard and printed in the already described manner.

In order to properly distinguish the individual amounts, it is in this case advisable to provide the sign printing type wheel 108 with an additional "*x*" type which is associated with the multiplier by insertion of a special setting device.

In the embodiment shown as an example, the arrangement is devised in such a way that one can both calculate and also calculate and record.

I claim:

1. In a calculating recording machine, the combination with a keyboard; a totalizer; actuating mechanism for the totalizer; differential setting means for a part of the actuating mechanism, controlled by the keyboard; recording means, including type carriers; differential setting means for the type carriers, settable under control of the differential setting means for the actuating mechanism; means to normally restrain the type carriers against operation; and a motor; of a speed change gearing driven by the motor and provided with clutch faces for the high and low speeds, respectively; a gear train connected with the actuating mechanism and including a driven clutch member; means to shift the driven clutch member into engagement with the driving clutch members of the high and low speed changing gearing, selectively; means to displace the restraining means to free the type carriers for operation; and means controlled by said clutch shifting means to couple or uncouple the displacing means to open the gear train simultaneously with the coupling or uncoupling of the driven clutch member with said low speed clutch face.

2. In a calculating recording machine, the combination with a keyboard; a totalizer; actuating mechanism for the totalizer; differential setting means for a part of the actuating mechanism, controlled by the keyboard; recording means, including type carriers; differential setting means for the type carriers, settable under control of the differential setting means for the actuating mechanism; means to normally restrain the type carriers against operation; and a motor; of a speed change gearing driven by the motor and provided with clutch faces for the high and low speeds, respectively; a gear train connected with the actuating mechanism and including a driven clutch member; means to shift the driven clutch member into engagement with the driving clutch members of the high and low speed changing gearing, selectively; means to displace the restraining means to free the type carriers for operation; means controlled by said clutch shifting means to couple or uncouple the displacing means to or from the gear train simultaneously with the coupling or uncoupling of the driven clutch member with said low speed clutch face, the recording means also including means to take impressions from the type; and means operable by the displacing means to actuate said impression taking means subsequently to the release of the type carrier differential setting means.

3. In a calculating machine, the combination

with a totalizer; actuating means therefor; recording mechanism, including type carriers, differential setting means for the type carriers; and impression taking means; means to normally restrain the differential setting means against operation; and a motor; of a change speed gear train interposed between the motor and said actuating mechanism; a driven clutch member shiftable to connect either the high or the low speed section with the actuating means; means to displace said restraining means for the type carrier differential setting means to free said differential setting means for operation; a clutch to connect said displacing means with the actuating means; a clutch shifter common to both of said clutches to couple the high speed section of the gear train with the actuating mechanism, and simultaneously uncouple said displacing means from the actuating mechanism, or to couple the actuating mechanism and the displacing means when the gear train is set for low speed; means normally locking the impression taking means against operation; and means operated by the restraining means to release said lock.

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