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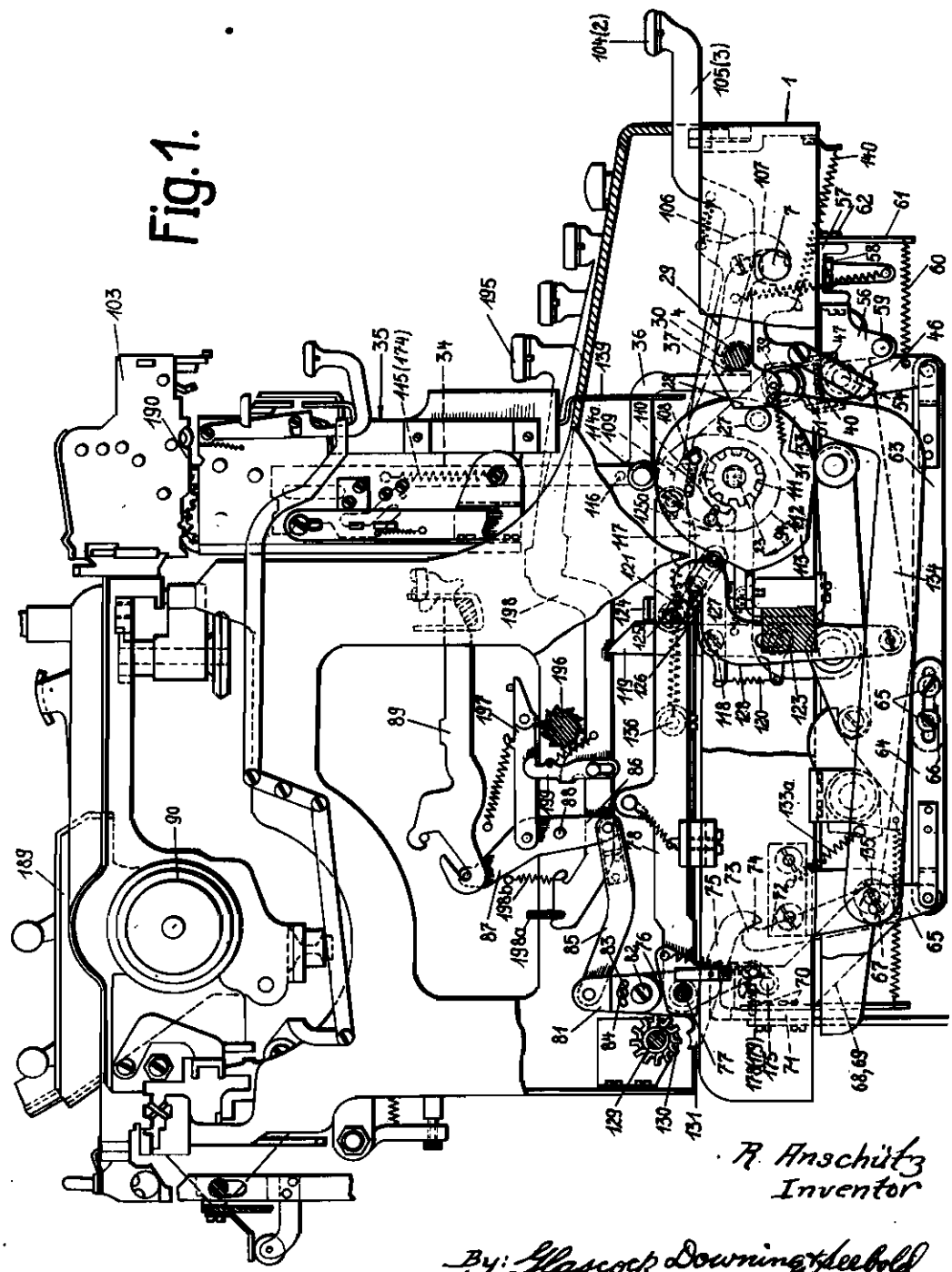
MAY 25, 1943.
BY A. P. C.

R. ANSCHÜTZ
TYPEWRITING CALCULATING MACHINES, BOOKING MACHINES, AND SIMILAR MACHINES
Filed Nov. 21, 1938

Serial No.
241,672

9 Sheets-Sheet 1

Fig.1.



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Inventor

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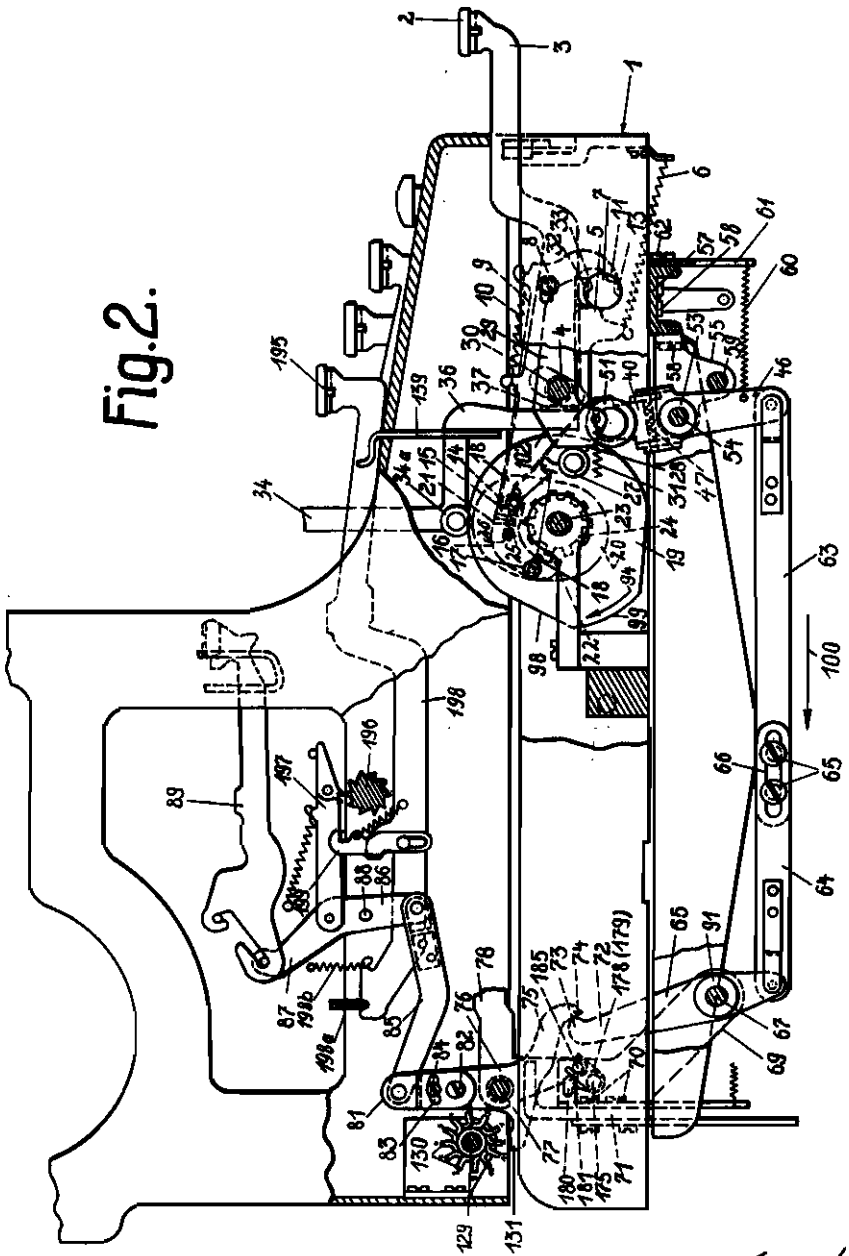
Fig.2.



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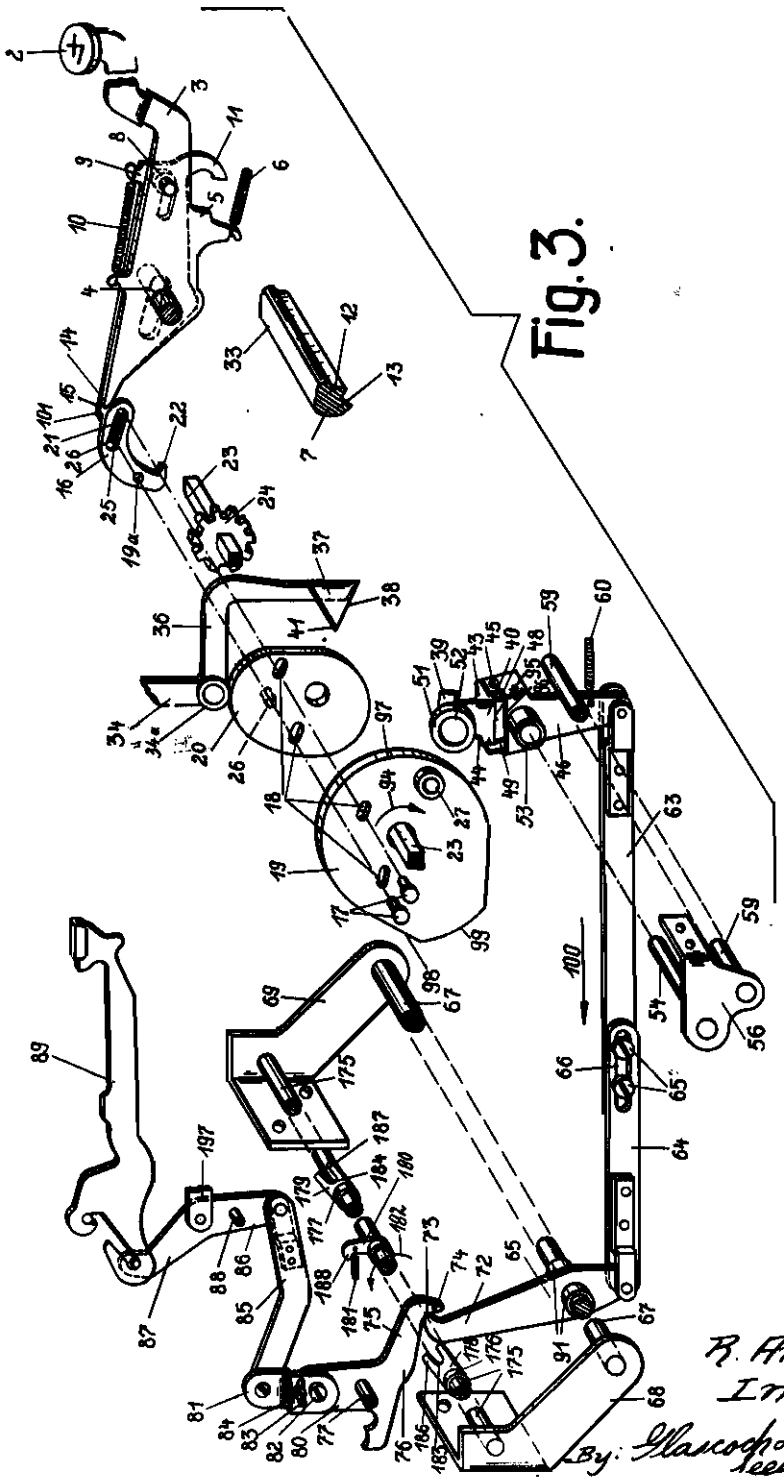

Fig. 3.

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Fig. 4

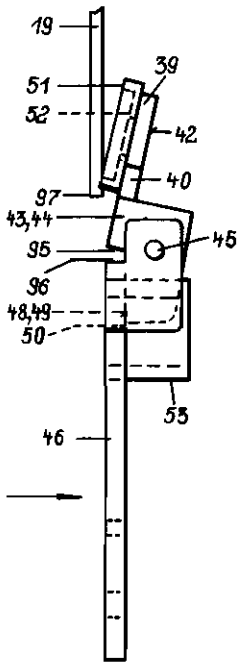

Fig. 5

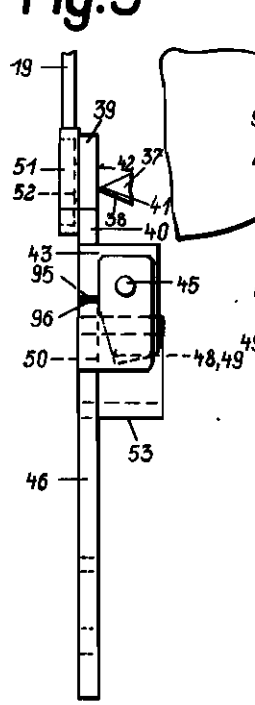

Fig. 6.

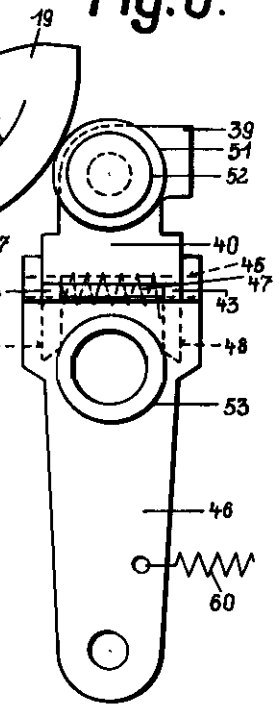

Fig. 9

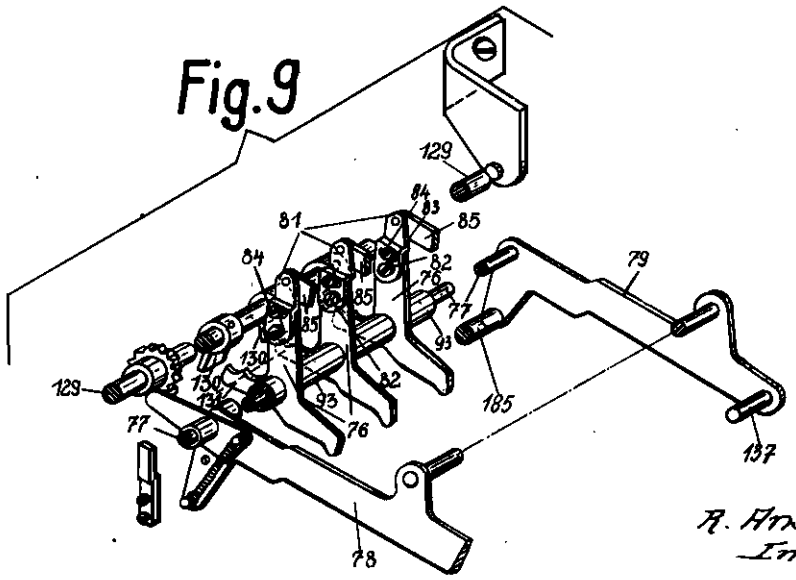

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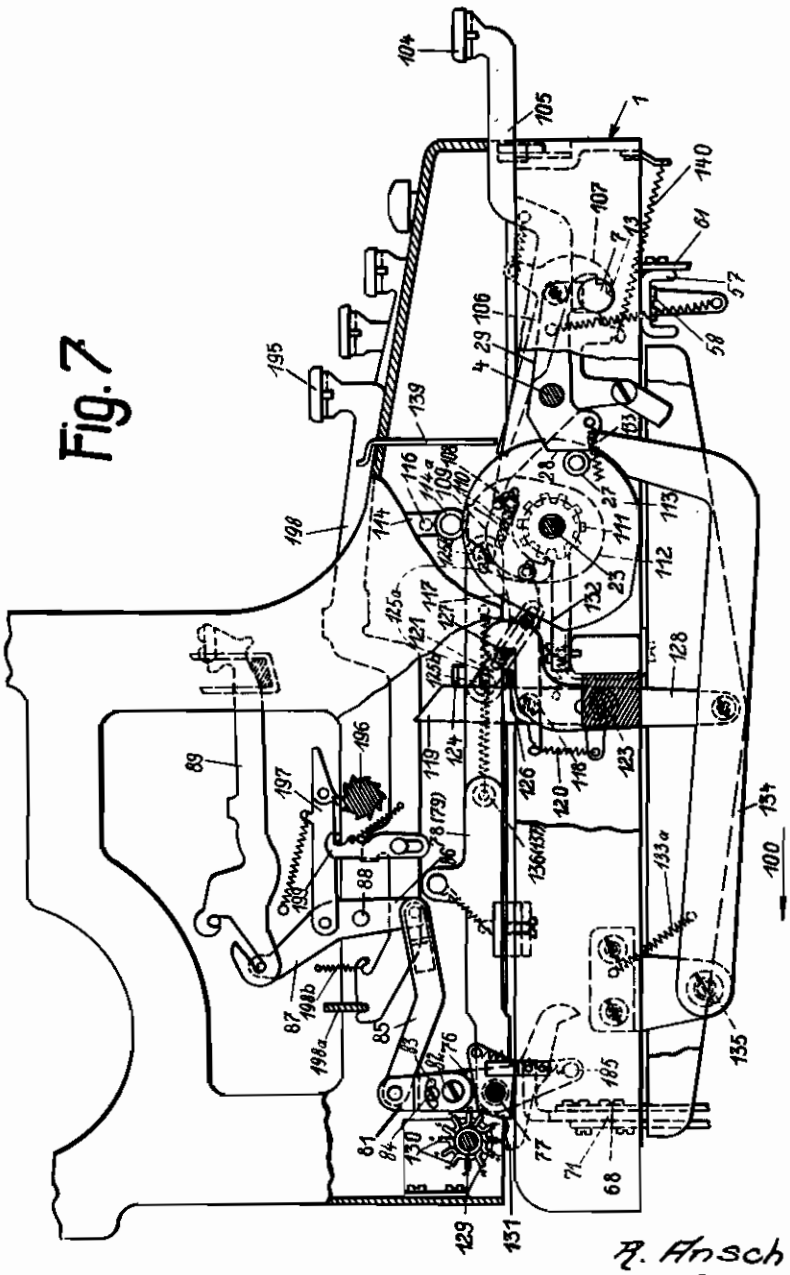
Fig. 7



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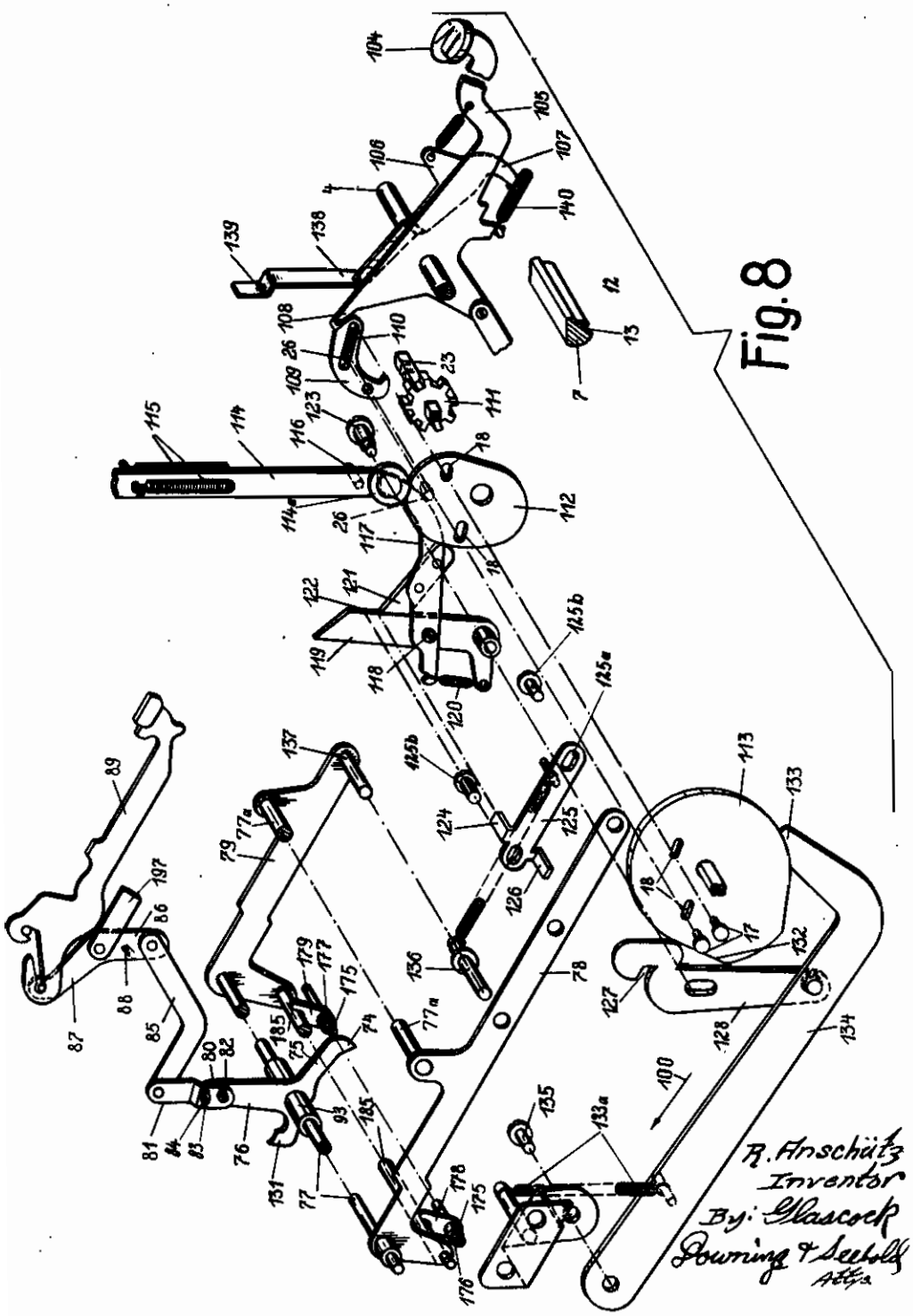

Fig. 8

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Fig. 11

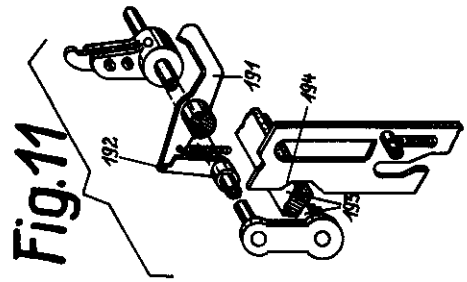

Fig. 10

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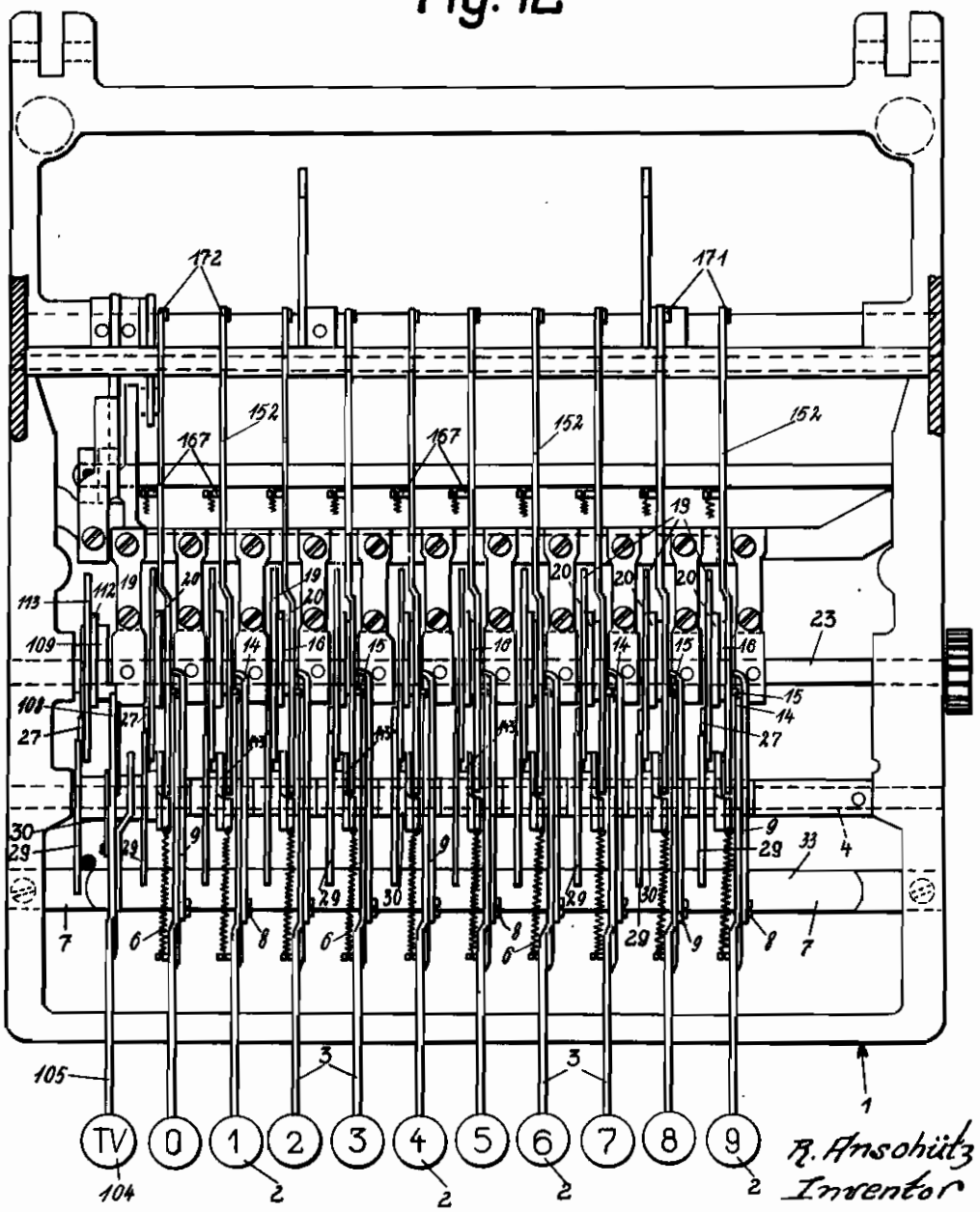
Fig. 12



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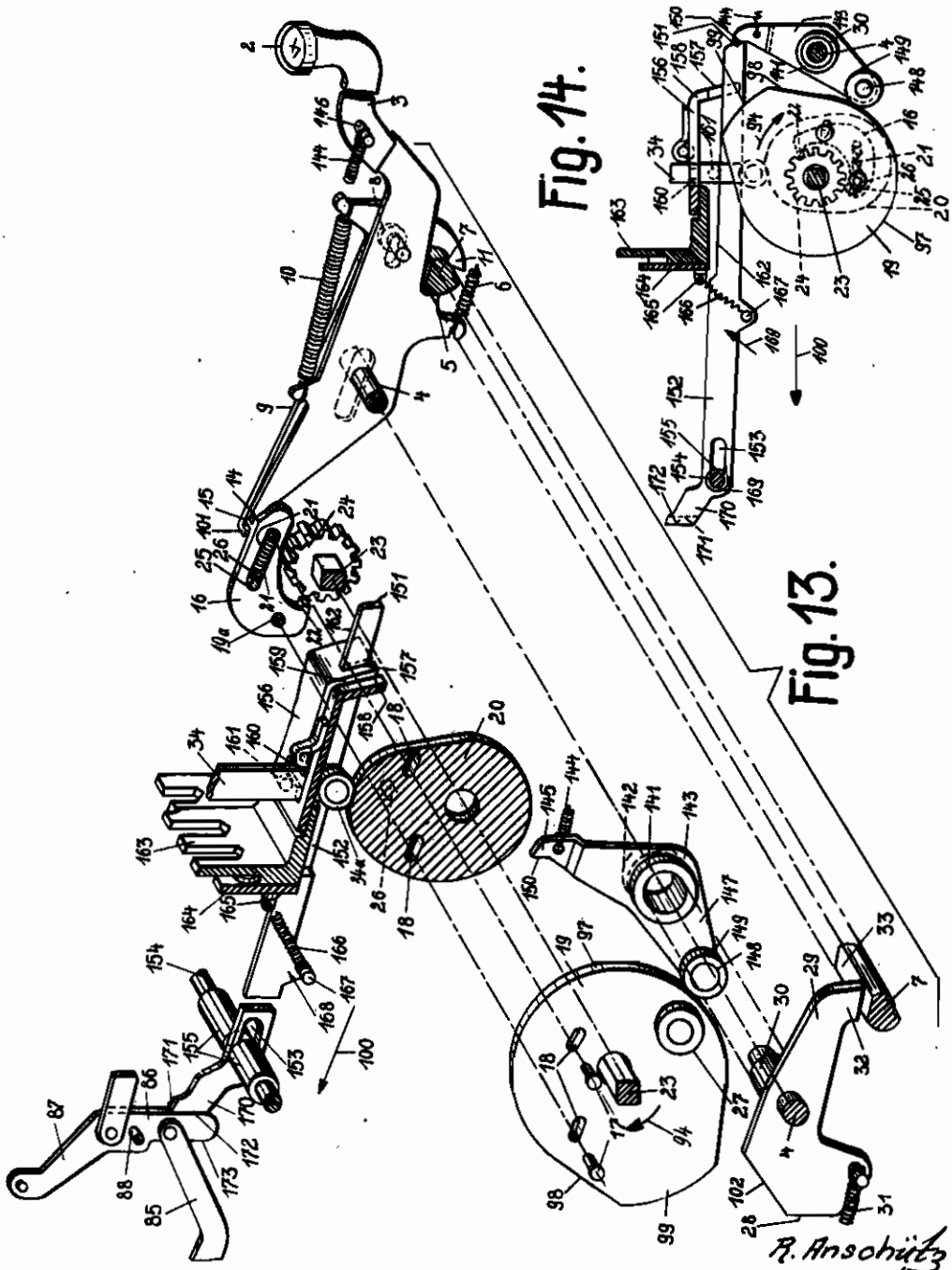

Fig. 14.

Fig. 13.

R. Anschütz
Inventor

By: Glascock Downing & Seibold
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ALIEN PROPERTY CUSTODIAN

TYPEWRITING CALCULATING MACHINES, BOOKING MACHINES, AND SIMILAR MACHINES

Robert Anschütz, Zella-Mehlis, Germany; vested in the Alien Property Custodian

Application filed November 21, 1938

This invention relates to typewriting calculating machines, booking machines, and similar machines, with separate sets of number typing and calculating keys, a typewriting mechanism and a calculating mechanism, a drive for the typewriting mechanism, and a drive for the calculating mechanism. The expression "calculating mechanism" is intended to include the total taking mechanism which is connected to the calculating mechanism.

In machines of this class, as designed heretofore, the typewriting mechanism is connected to its drive through the medium of the totalizing slides forming part of the calculating mechanism. Obviously, the condition for satisfactory operation is exact synchronisation of the drive for the typewriting and of the drive for the calculating mechanism, but, notwithstanding the utmost care in this respect, it would happen that when a value was introduced or a total was taken, the typewriting mechanism was not connected to its drive at the proper time, and so the value, or total, as the case might be, was not typed. On the other hand, the machine requires a separate set of typing keys in addition to the set of calculating keys, as it is necessary that numbers should be typed independently of the calculating and total taking operations, and so it is not feasible to effect the typing of the numbers through the drive for the calculating mechanism.

This difficulty is eliminated, and failure through lack of synchronism is prevented, by arranging the typewriting mechanism so as to be connected to its own drive by the number of typing keys, and to the drive for the calculating mechanism by the calculating keys.

By these means, it is possible, on the one hand, to operate the typewriting mechanism independently of the calculating mechanism and, on the other hand, to operate it through the drive for the calculating mechanism independently of its own drive, when a value is introduced in the calculating mechanism.

In the drawings, Figs. 1 to 9 illustrate the first, and Figs. 10 to 14 illustrate the second constructional example. More particularly,

Fig. 1 is an elevation of the machine, viewed from its left-hand side, and partly broken away.

Fig. 2 is a partial elevation of the machine, viewed as in Fig. 1 but showing principally the parts involved in the calculating operation.

Fig. 3 is a perspective illustration of the parts shown in elevation in Fig. 2.

Figs. 4 and 5 are end elevations, viewed from the front of the machine, of a link in the transmission mechanism from the drive of the calculating mechanism to the typewriting mechanism, in the inactive and active position of the link, respectively.

Fig. 6 is a side elevation of the link, viewed in the direction of the arrow in Fig. 4.

Fig. 7 is an elevation which is similar to Fig. 2 but shows principally the parts involved in total taking.

Fig. 8 is a perspective illustration of the parts shown in elevation in Fig. 7.

Fig. 9 is a perspective illustration of a swinging frame forming part of the said transmission mechanism.

Fig. 10 is a side elevation of the machine equipped with the second constructional example, partly broken open.

Fig. 11 is a perspective illustration of a detail of Fig. 10.

Fig. 12 is a plan view of the lower frame of the machine.

Fig. 13 is a perspective illustration of certain parts shown in elevation in Fig. 10.

Fig. 14 shows in elevation a detail of Fig. 13.

General Description of the Machine

The machine is provided with a lower frame 1 which will be referred to as the "bearing frame," since it supports several important bearings, and with a detachable upper frame placed on the bearing frame 1. The calculating keys 2 are mounted with its bars 3 to swing about a transverse rod 4 in the bearing frame 1 on which rod 4 the total taking key 104 is also mounted to swing ath the left-hand side of the bearing frame 1. The bearing frame 1 also supports the driving shaft 23 for the calculating and totalizing mechanism which is arranged in a casing 35 on the front plate of the upper frame. A set of number typing keys 195 are arranged in the upper frame and the tail ends of their key bars 198 are notched and mounted to swing about the lower edge of a transverse bar 198a in the upper frame against which they are held by springs 198b. The type levers 89 of the typewriting mechanism are also arranged in the upper frame, together with a serrated driving shaft 196 for the typewriting mechanism. The usual paper carriage 189 and column totalizers 103 are mounted to slide on the top of the upper frame. A motor and reduction gearing, not shown, may be provided for rotating the driving shafts 23 and 196.

I. The arrangement of the parts involved in the calculating operation of the first constructional example

Referring now to Figs. 1 to 9, the type bars 3 of the ten keys 2 in the calculating keyboard are mounted to swing on the rod 4 in the bearing frame 1.

In the following, that calculating key 2 which bears the number "4," and the parts and mechanisms allotted to this key, will be described, it being understood that the other nine keys, and the parts and mechanisms allotted to them, are quite similar.

Each calculating key bar 3, as shown for the "4" key bar in Fig. 3 is provided with an abutment 5 projecting from its lower edge, and in the normal position of the key bars 3 a spring 6 holds the abutment 5 of each bar against the rear side of a locking bar 7 secured in the bearing frame 1. A pawl 9 is arranged at the right-hand side of each key bar 3 and slotted for sliding on the rod 4 and on a headed screw 8 secured in the key bar. At its front end, the pawl is equipped with a locking tooth 11 which a spring 10 holds against a step 12 in the front side of the locking bar 7. When one of the calculating keys 2, for instance, the "4" key, is depressed, the tooth 11 engages in a groove 13 in the lower side of the locking bar 7, and holds the key 2 in its depressed position.

The tail end 14 of each key bar 3 is arranged to cooperate with a projection 15 on a coupling member 16. This member 16 is mounted to slide on a camplate unit 19, 20. One such unit 19, 20 is allotted to each key bar 3, and seated on the driving shaft 23. The driving shaft 23 is of square cross-section for accommodating square holes in the bosses of coupling pinions 24 allotted to the individual camplate units 19, 20 so that its rotation of the shaft 23 is not interfered with when the camplate units are arrested.

The coupling member 16 is mounted to slide on its camplate unit 19, 20. This connection is effected by a pair of rivets 17. In Fig. 3, and in some other figures, certain parts are shown at a distance from the members to which they are connected, for the sake of clearness. Thus, the two rivets 17 are shown in front of the camplate 19 while in fact the rivet at the left is inserted in a hole 19a in the coupling member 16, and the rivet at the right engages in the front end of a longitudinal slot 25 in the coupling member 16. The rivets 17 extend through slots 18 in the camplates 19 and 20. A pin 26 on the camplate 20 engages in the rear end of the slot 25, and a spring 21 in the slot is inserted between the rivet 17 at the right, and the pin 26. The spring 21 holds the projection 15 against the tail end 14 of the calculating key bar 3 and in this position a tooth 22 on the member 16 is out of mesh with the teeth of the corresponding pinion 24 on the shaft 23. The shaft 23 rotates clockwise in the direction indicated by the arrow 94. The reaction of the spring 21 against the pin 26 exerts a torque in anti-clockwise direction on the camplate unit 19, 20 whose camplates 19, 20 are rigidly connected but which, as a unit, is free to turn on the shaft 23, as described. By this torque, a roller 27 on the camplate 19 is wedged against an inclined edge 28, Fig. 2, of a catch 29 and the camplate unit 19, 20 is held in its normal position.

The catch 29, as best seen in Fig. 12, is mounted to swing about the rod 4 with its boss 30, and a spring 31 turns the catch clockwise and holds its tail end 32 against the flattened top 33 of the locking bar 7 in the initial position of the catch 29. An incline 102 is arranged on the upper side of the catch 29 adjacent the wedging edge 28.

The camplates 20 cooperate with totalizing slides 34, Fig. 1, forming part of the calculating mechanism in the casing 35. A roller 34a at the lower end of each slide 34 is held against the edge of the corresponding camplate 20 by springs 174. A rectangular arm 36 extends downwardly from each totalizing slide 34 at its lower end, and a wedge 37 extends to the left at right angles from the lower end of the arm. The lower edge 38 of the wedge 37 is arranged to strike a lug 39, Figs. 3 to 6, on a U-shaped tilting member 40 and whose shanks 43 and 44 are pivoted on a pin 45 secured in the U-shaped upper portion of a link 46. This link 46 is mounted to swing about a rod 54 with its boss 53. The rod 54 is supported by a pair of brackets 56 and 55 which are secured to a channel-section transverse bar 57, Fig. 2, by screws 58. A spring 60 tends to turn each link 48 anti-clockwise about the rod 54 and this movement is limited by a shaft 59 in the brackets 55 and 56. The other ends of the springs are connected to a comb-shaped bar 61, Fig. 2, which is connected to the bar 57 by screws 62.

A torsion spring 47, Fig. 6, on the pivot 45 turns the tilting member 40 clockwise about such pivot 45, as viewed in Fig. 4, until the edges 48 and 49 of the shanks 43 and 44 bear against the right-hand side 50 of the link 46. This is the normal position of the tilting member 40. A roller 51 is mounted to rotate about a rivet 52 on the tilting member 40, and when the totalizing slide 34 descends and the lower edge 38 of the wedge 37 strikes the lug 39 of the tilting member 40, the member 40 is moved into the position in Fig. 5 which is its active position and in which its roller 51 is in line with the camplate 19. In the active position of the tilting member 40, a point 41 on the wedge 37 at the lower end of the arm 36 bears against the right-hand side 42 of the tilting member 40, holding the member in its active position against the reaction of the torsion spring 47.

Pivoted to the lower end of each link 46 is one part 63 of a two-part connecting rod whose other part 64 is pivotally connected to the lower end of a swinging lever 65. The parts 63 and 64 of the connecting rod are slotted at 66 for adjusting the effective length of the connecting rod, and clamping screws 65 are provided for holding the parts in adjusted position. The swinging levers 65 are mounted to swing about a rod 67, Fig. 3, which is supported at its ends by bearing brackets 68 and 69, the brackets 68, 69 being secured to a transverse plate 71 at the rear of the bearing frame 1 by screws 70.

The upper end of each swinging lever 65, is an arm 72 with a cam 73 for cooperation with an incline 74 at the end of an arm 75 on a selectable member, or three-armed lever, 76. The three-armed levers 76 are mounted to swing about a shaft 77, Figs. 8 and 9, of a swinging frame having a pair of parallel frame members 78 and 79, a shaft 185 just below the shaft 77, a central stay 77a at the top of the frame, a journal 136 in the frame member 78, and a journal 137 in the front end of the frame member 79.

On the upwardly projecting vertical arm 80 of each selectable member or three-armed lever 76 an extension 81 is pivotally arranged about a screw 82. By means of an arcuate slot 63 and

a headed screw 84 inserted in the arm 80 and projecting through the slot, the angular position of the extension 81 with respect to the arm 80 can be varied. The upper end of the extension 81 is kinked and connected to the lower arm 86 of a double-armed lever 87 by a rod 85. The double-armed lever 87 is fulcrumed at 88 and its upper arm is operatively connected to a type lever 89 which is thrown against the platen in the carriage 80 when the double-armed lever 87, is turned clockwise. A hook 197, Fig. 1, is pivoted to the double-armed lever 87 at one end and with its free end is arranged to engage in one of the serrations of the driving shaft 196 when a number typing key 195 is depressed, causing the spring-controlled rod 199 to pull down the hook 197, so that the double-armed lever 87 is turned clockwise, and the type lever 89 is operated.

It is understood that the parts which have been described with reference to the calculating key 2 for the number "4," and its key bar 3, are also provided for the calculating keys 2 and their key bars 3 which bear the numbers "0" to "3," and "5" to "9."

The links 46 and the swinging levers 65 are spaced on the respective rods 54 and 67 by spacing sleeves, Fig. 9 shows spacers 83 for the selectable members, or three-armed levers, 76, on the shaft 77.

II. The calculating operation

When, for calculating, for instance, the number "4" in the calculating mechanism, the calculating key 2 for the number "4" is depressed, its key bar 3 is turned clockwise about the rod 4 and the pawl 9 partakes in this movement. Its tooth 11 slides off the step 12 and at the end of the movement of key bar 3 under the action of the spring 10 engages in the groove 13 in the locking bar 7, and the key bar 3 is held in its depressed position. When the key bar 3 is depressed, its tail end 14 releases the projection 15 on the coupling member 16, and the spring 21 throws the tooth 22 in between the teeth of the pinion 24. The camplates 19 and 20 now rotate together and with the continuously rotating driving shaft 23 which, as mentioned, is rotated in the direction of arrow 94 by the motor—not shown—of the machine. The corresponding totalizing slide 34, under the action of its spring 174 descends from the elevated portion of the rotating camplate 20 to its depressed position, and the totalizing slide 34, through the inclined edge 38 of the wedge 37 at the lower end of its arm 36, engages the lug 39 of the tilting member 40 on the link 46, and turns this member 40 anti-clockwise against the action of the torsion spring 47, until the edge 95 of the tilting member 40 bears against the edge 96 of the link 46, Fig. 5. When the edges 95 and 96 encounter, the edge 39 of the wedge 37 has moved off the lug 39 of the tilting member 40. The point 41 of the wedge 37 now bears against the side 42 of the lug 39 and holds the tilting member 40 in its active position with respect to the camplate 19. The roller 51 of the tilting member 46 is now engaged by the edge 97 of the camplate 19 but for the present the link 46 is not operated as the depressed portion of the camplate 19 now moves past the roller 51. However, when the camplate 19 has performed about one-half of a revolution, the ascending edge 98 of the camplate which leads to its elevated portion 99, begins to operate the transmission mechanism, that is, the train of parts between the camplate 19 and the selectable members or three-armed levers, 76. The ascending edge 98 bears against the roller 51 on the tilting member 40 and, upon further rotation of the camplate 19, turns the tilting member 40, and the link 46 clockwise about the rod 54 against the spring 60. The connecting rod 63, 64 is moved in the direction of the arrow 100 in Fig. 3, the swinging lever 65 is turned clockwise about the rod 67, and its cam 73 acts on the incline 74 of the arm 75 of the selectable member, or three-armed lever 76. This is a one-way connection since 73 acts on 74 only when the swinging lever 65 turns clockwise. The selectable member, or three-armed lever, 76, is now turned anti-clockwise about the shaft 77 in the swinging frame 78, 79. This causes the connecting rod 65 to move in the direction of the arrow 180 and the double-armed lever 87 is turned clockwise about its fulcrum 88, and the type lever 89 for the number "4" is thrown against the platen 90 in the carriage 189.

When the type lever 89 has performed its stroke, the camplate 19 has rotated so far as to move its elevated portion 99 away from the roller 51. The consequence is that the link 46 and its tilting member 40 return into their initial position under the pull of the spring 60, turning anti-clockwise about the rod 54 until the link 48 bears against the shaft 59. When the link 46 returns into the initial position, as shown in Fig. 2, the swinging lever 65 is turned anti-clockwise about the rod 67 by the connecting rod 63, 64, and assumes the position in Fig. 2. The projection 13 of its arm 72 releases the incline 74 of the lever 76, and the lever 76, with its extension 81, the connecting rod 85, and the double-armed lever 87 return into their initial positions, Fig. 2, under the action of the type lever 89 which returns by gravity.

Upon further rotation of the camplate unit 19, 20 in the direction of arrow 94 the elevated portion of the cam 20 elevates the totalizing slide 34 through its roller 34*a* against the action of spring 174. The point 41 of the wedge 37 on the arm 36 of the totalizing slide 34 in consequence releases the lug 39 of the tilting member 40 and this member, under the action of the torsion spring 47, turns clockwise, as viewed in Fig. 5, about its pivot 45 and back into the inactive position Fig. 4, in which the edges 48 and 49 of the shanks 43 and 44 of the U-shaped member 48 bear against the side 50 of the link 46. The roller 51 on the tilting member 46 also moves beyond reach of the camplate 19.

A short time before the camplate unit 19, 20 and the coupling member 16 have completed their revolution, the projection 15 of the member 16 acts on a deflected portion 101 of the pawl 9 which is in the path of the projection, 15, and shifts the pawl to the front against the spring 10. The tooth 11 of the pawl 9 leaves the groove 13 in the locking bar 7 and the spring 6 returns the calculating key bar 3 and the pawl 9 into their normal positions, as shown in Figs. 2 and 3. The tail end 14 of the calculating key bar 3 returns into the path of the projection 15 of the coupling member 16.

At the same time, the roller 27 on the camplate 19 acts on the incline 102 of the catch 29, turning the catch 29 anti-clockwise about the rod 4 against the spring 31. Just before the camplate unit 19, 20 has completed its revolution the projection 15 of the coupling member 16 strikes the tail end 14 of the calculating key bar 3, as described, and this, in addition to the throwing

out of the pawl 9, causes the tooth 22 of the coupling member to clear the pinion 24 against the spring 21, and the rotation of the camplate unit 19, 20 is now interrupted. When the roller 27 on the camplate 19 has left the incline 102 of the catch 29, the spring 31 returns the catch 29 into its initial position, Fig. 2, the roller 27 is wedged against the edge 28 of the catch 29, and the camplate unit 19, 20 and the coupling member 16 are held in their normal position.

III. Total taking

Assume that one of the column totalizers 103 indicates, in any decimal place, the number "4". This value "4" is now typed upon depression of the total taking key 104, Figs. 7 and 8 and the total taking operation started thereby, by the mechanism according to the invention, as follows:

When the total taking key 104 is depressed, its key bar 105 turns clockwise about the rod 4, and a pawl 108 which is fulcrumed on the key bar 105, partakes in this movement. The tooth 107 of the pawl 106 leaves the step 12 in the locking bar 7 and jumps into the groove 13 in its lower side, holding the total taking key 104 in its depressed position.

When the key bar 105 is depressed, its tail end 108 moves out of active position with respect to a coupling member 109 which is arranged on the camplate unit 113, 112 of the total taking mechanism in a manner similar to the arrangement described with reference to the camplate units 19, 20 of the calculating mechanism. The spring 110 of the coupling member 109 now moves the member into engagement with a coupling pinion 111 on the driving shaft 23, which, it will be remembered, rotates continuously, in the direction of the arrow 94. The camplate unit 113, 112 is now coupled to the shaft 23 for one revolution.

When the camplate unit 113, 112 begins to rotate in the direction of the arrow 94, a roller 114*a* at the lower end of an unlocking slide 114—which is only partly shown in Figs. 7 and 8—descends on the descending portion of the camplate 112 under the action of springs 115. A pin 118 on the descending unlocking slide 114 acts on a double-armed lever 117 which is fulcrumed about a headed screw 118 on a bellcrank 119. A spring 120 which connects the rear end of the double-armed lever 117 to the shorter arm of the bellcrank 119 tends to turn the double-armed lever 117 anti-clockwise until an abutment 121 on the double-armed lever 117 bears against the front edge 122 of the bellcrank 119. When the pin 116 on the unlocking slide 114 acts on the lever 117, the lever 117 and the bellcrank 119 are turned clockwise about a headed screw 123 about which the bellcrank 119 is fulcrumed. The front edge 122 of the bellcrank 119 acts on a lug 124 of a slide 125. This slide is equipped with slots 125*a* by which it is guided on headed screws 125*b* supported by the member 78 of the swinging frame. A spring attached to the journal 136 pulls the slide 125 to the rear. The bellcrank 119 shifts the slide 125 forwards, and a lug 126 which is deflected from the slide engages in a slot 127 in the upper end of a latch 128 and couples the latch to the swinging frame 76, 78. At its lower end, the latch is fulcrumed on a one-armed feeler 134 whose front end 133 is held against the camplate 113 with its free end 133 by a spring 133*a*.

During the zero setting in the calculating mechanism a selector cam shaft 129, Figs. 7 and 9, is rotated clockwise to place that selector cam 130 which corresponds to the number "4" in line with the third arm 131 of the corresponding selectable member, or three-armed lever 78.

When upon further rotation of the camplate unit 113, 112 in the direction of the arrow 94, the ascending portion 132, of the camplate 113 acts on the end 133 of the feeler 134 and turns the feeler clockwise about its fulcrum screw 135. The latch 128 partakes in this movement and, through its slot 127 and the lug 126 of the slide 125, pulls down the slide and the swinging frame 77, 78, 79 is turned clockwise about its journals 138 and 137. Immediately upon the beginning of the movement of the swinging frame, and the raising of the shaft 77, with the selectable members, or three-armed levers 76 on the shaft, the third arm 131 of the lever 76 which is allotted to the number "4" strikes the corresponding selector cam 130 on the shaft 129. This causes the lever 76 to turn about the shaft 77 as the swinging frame moves further, in anti-clockwise direction, so that the extension 81 of the lever 76 pulls the connecting rod 85 which is pivoted to the extension 81, in the direction of the arrow 100, Fig. 8. The connecting rod 85 swings the double-armed lever 87 allotted to the type lever 89 for the number "4" clockwise about the fulcrum 88, and the type lever 89 allotted to the number "4" now strikes the number on the platen.

When the camplate unit 113, 112 rotates further, the elevated portion of the camplate 133 releases the end 133 of the feeler 134, so that the feeler 134 and the swinging frame 77, 78, 79 are free to return into their initial positions, as shown in Fig. 7. Similarly, the elevated portion of the camplate 112 raises the unlocking slide 114 and the pin 118 of the slide releases the double-armed lever 117 and breaks the connection between the lug 126 on the slide 125 and the slot 127 in the latch 128. When the camplate unit 113, 112 has almost completed its revolution, the kinked end 138 of a slide 139 in Figs. 7 and 8, descends and turns the pawl 106 anti-clockwise. The tooth 107 of the pawl leaves the groove 13 in the locking bar 7, and the total taking key bar 105 of the total taking key 104, together with the pawl 108, returns into its initial position, Fig. 7, under the action of the spring 140. When the key bar 105 is in its initial position, the coupling member 109, after a complete revolution of the camplate unit 113, 112, bears against the tail end 108 of the key bar, and the camplate unit 113, 112 is uncoupled from the continuously rotating driving shaft 23.

At the same time, the selector cam shaft 129 is returned into its initial position, so that now all parts are in their initial positions, as shown in Fig. 7.

IV. The arrangement of the parts involved in the calculating operation of the second constructional example

The arrangement and operation of the parts of the second constructional example will now be described with reference to Figs. 10 to 14.

The camplate units 19, 20, the key bars 3 of the calculating keys 2, the coupling member 18, and the pinion 24 allotted to each camplate unit 19, 20, as shown in Fig. 12, are similar to those illustrated in Fig. 3, and will not be described again. As in the previous example, the parts allotted to each calculating key are alike for all

keys and therefore only the parts corresponding to the number "4" will be described.

The catch 28 allotted to the calculating key bar 3 for the number "4," Fig. 12, is mounted to swing about the rod 4 with its boss 30, as described. Mounted to swing on the boss 30 by bosses 141 and 142 is a link 143. The bosses 141 and 142 of the link 143 space the calculating key bar 3 from the link 143, and the link 143 from the catch 28, so that the link 143 is held against lateral displacement, as shown in Fig. 12. A spring 144, Fig. 13, whose rear end is attached to the upper end 145 of the link 143—the end being kinked to the right—and whose front end is attached to a pin 146 on the calculating key bar 3, turns the link 143 clockwise about the shaft 4 and the initial position of the link 143 is defined by a roller 148 on a rivet 148 at the lower end 147 of the link 143 bearing against the edge of the camplate 19. As the camplate unit 19, 20 rotates in the direction of the arrow 84 the elevated portion 99 of the camplate 19 acts on the roller 149 on the link 143.

The kinked upper end of the link 143 has a rear edge 150 for engaging the front end 151 of a push rod 152. This arrangement corresponds to the one-way connection 73—74 in Fig. 3. In the initial position of the parts, as shown in Figs. 10 and 13, the push rod 152 is raised and its front end 151 clears the edge 150 of the link 143. The push rod 152 is slotted near its rear end at 153 and is mounted to slide on, and to swing about, a rod 154 secured in the upper frame of the machine. The rear ends 151 of the push rods 152 are guided between spacing sleeves 155 on the rod 154. The front ends of the push rods are guided in slots of a comb 156. The comb 156 is provided for this purpose with an inclined rib 158 which extends downwards along its front. The push rod 152 for the number "4" is guided in a slot 157 in the rib 158. At the side of the slot 157, a long slot 159 is made in the comb 156 for the reception of the totalizing slide 34 allotted to the number "4," and at its right-hand side is made an extension 160 for a pin 161 to pass as the slide descends under the control of its springs 174 and the camplate 20, as described above. The pin 161 is arranged to bear against the upper edge 162 of the push rod 152.

The comb 156 for guiding the totalizing slides 34 and the push rods 152 is connected to a bar 163 for the roller lock of the key bars of the number typing keys 195. The bar is secured in the upper frame of the machine. A strip 164 Figs. 3 and 4, is equipped with eyes 165 for a spring 166 for each push rod 152 which is connected to a pin 167 on the corresponding push rod 152. The spring 166 urges the push rod 152 in upward and forward direction, as indicated by the arrow 168 in Fig. 13, and the rear end 169 of the slot 153 bears against the rod 154, defining the initial position of the push rod 152.

At its rear end, the push rod has an upwardly directed portion 170 and the rear end of this portion is reinforced by a plate 171 for imparting a wider rear edge 172 to the push rod 152. This rear edge 172 of the slide 152 is arranged to cooperate with a downward extension 173 on the lower arm 86 of the double-armed lever 87 which is operatively connected to the type lever 89 for the number "4." As mentioned, the parts which have been described, are allotted also to the other calculating keys 2 from "0" to "3," and from "5" to "9."

V. The calculating operation

When, for calculating, by way of example, the value "4," the calculating key 2 corresponding to the number "4" is depressed, and its key bar 3 swung, the camplate unit 19, 20 is coupled with the shaft 23 for a full revolution in the direction of the arrow 84, in the manner described in chapter II. The corresponding totalizing slide 34 descends on the descending portion of the camplate 20 under the action of its spring 174. When the totalizing slide 34 descends its pin 161 moves through the recess 160 in the totalizing slide guiding comb 156, engages the upper edge 162 of the pushrod 152 and swings the rod clockwise about the rod 154 against the spring 166. This, as shown in Fig. 4, places the front end 151 of the push rod 152 into the path of the edge 150 on the link 143.

At the beginning of the revolution of the camplate unit, 19, 20, the camplate 19 moves along the roller 149 of the link 143 with its edge 97 without influencing the link 143 and upon further rotation in the direction of the arrow 84 the configuration of the camplate 20 allows the totalizing slide 34 to remain in the position illustrated in Fig. 14, for the present. The pin 161 consequently holds the pushrod 152 down and its front end 151 remains in the path of the edge 150 of the link 143. Later, the ascending edge 98 of the camplate 19, through the roller 149 swings the link 143 about the shaft 4 in anti-clockwise direction. The push rod 152 is now shifted in the direction of the arrow 100, Fig. 13, against the spring 166, its rear edge 172 acts on the extension 173 of the arm 86 on the double-armed lever 87, and swings it clockwise about the fulcrum 88. This movement of the double-armed lever 87 causes the type lever 89, which corresponds to the number "4," to be thrown against the platen 90 on the paper carriage 199.

As described with reference to the first constructional example, the parts which are operatively connected to the double-armed lever 76 are involved when the push rod 152 is pushed back in the direction of the arrow 100, and the clockwise swinging of the double-armed lever 67 caused thereby. Such parts are the connecting rod 85, the extension 81, and the selectable member 70 which, in this instance, is without the arm 75 in the first constructional example. This movement of the member 76, however, does not produce any effect.

When the type on the lever 89 has been typed, the camplate unit 19 and 20 has rotated so far that the roller 149 of the link 143 is again released by the elevated portion 98 of the camplate 19, whereby the link 143 under the pull of its spring 144, is returned clockwise into its initial position, as shown in Fig. 10, in which the roller 149 of the link 143 is again on the edge 97 of the camplate 19.

When the link 143 returns into the initial position in Fig. 10, its edge 150 releases the front end 151 of the push rod 152 and the spring 198 fetches the push rod forward against the arrow 100, until the end 169 of its slot 153 bears against the rod 154. The rear edge 172 of the push rod 152 now releases the extension 173 on the arm 86 of the double-armed lever 87 and the type lever 89, returning by gravity, moves the double armed lever 87 into the initial position shown in Fig. 10.

As the camplates 19 and 20 rotate further, the elevated portion of the camplate 20, through the roller 34*a* of the toalizing slide 34, raises this slide against the action of its spring 174. The

pin 161 of the totalizing slide 34 recedes from the upper edge 162 of the push rod 152 and the spring 166, acting in the direction of the arrow 168, turns the push rod 152 anti-clockwise about the pin 154 and into the normal position shown in Fig. 10, in which the upper edge 162 of the push rod 152 is arrested by the upper end of the guiding slot 157.

When the camplates 19 and 20, and the coupling member 16, have performed a complete revolution, they are uncoupled from the continuously rotating shaft 23, as described in chapter II, and the calculating key bar 3 returns into its normal position.

VI. Preventing distortion of the swinging frame

As described in chapter III, the swinging frame 77, 78, 79 shown in Figs. 7, 8 and 9 is moved clockwise about its journals 138 and 137 upon rotation of the total taking camplate 113 at the left of the machine, through the feeler 134, the latch 128, the lug 126 of the slide 125. This produces one sided stress in the swinging frame, particularly when typing a number of higher order, i. e., "9" or some adjacent number. For instance, when the number "9" is typed, whose selectable member, or three-armed lever 76 is at the right-hand end of the shaft 77, and when the arm 131 of this member engages the selector cam 130 on the selector cam shaft 129 which corresponds to the number "9", at the beginning of the movement of the swinging frame, the frame member 79 is restrained at the right-hand side of the swinging frame while the frame member 78 at the left-hand side is free to move on, causing distortion of the frame. This is prevented by the following arrangement:

A shaft 175 is mounted to rotate in the bearing brackets 88 and 69, Fig. 3, which support the rod 67 for the swinging levers 85, and on the shaft 175 are secured the bosses 176, 177 of forks 178 and 179, and a check 180, with a projection 188 at its upper end. A spring 181 which is attached to the check 180 at one end, and to the transverse plate 71, Fig. 2, at the other, tending to turn the shaft 175 in the direction of the arrow 182, and to hold the projection 188 of the check against the plate 71. The slots 183 and 104 of the forks 178 and 179 engage the shaft 185 of the swinging frame in the normal position of the frame, Fig. 8. In this normal position of the frame, the forks are held inclined in forward direction, against the action of the spring 181. When the swinging frame is turned clockwise, as described in chapter III, the left-hand end of the shaft 185 acts on the edge 186 of the fork 178 and turns the fork and the shaft 175 in the direction of the arrow 182, Fig. 3. The fork 179 engages the right-hand end of the shaft 185 with its edge 187 and distortion of the swinging frame is prevented by this fork 179 acting on the right-hand end of the shaft 185. When the swinging frame has turned through a given angle in clockwise direction, the shaft 175 has turned in the direction of the arrow so far that the projection 188 of the check 180 engages the front face of the plate 71. The shaft 175 and the forks 178 and 179 are now arrested against moving in the direction of the arrow 182 and when the swinging frame turns further, the shaft leaves the slots 183 and 184 of the forks 178 and 179. After the shaft 185 has cleared the forks 178 and 179, the spring 181 forces the projection 188 against the plate 71 and holds the shaft 175 with its forks 178 and 179 in position. When the swinging frame returns into its initial position, as shown in Fig. 7, its shaft 185 again engages in the slots 183 and 184 of the forks 178 and 179 and turns the forks 178 and 178, the shaft 175 and the check 180 against the spring 181 and against the arrow 182, into the normal position illustrated in Figs. 1, 2 and 3.

It will appear from the foregoing description that the connection betwen the camplates 19 and the type levers 89 is interrupted in the non-calculating condition of the machine, by the roller 51 on the tilting member 40 not being in active position, Fig. 4, or the push rod 152 being elevated, Fig. 10, beyond reach of the edge 150 on the link 143. The purpose for which this arrangement is provided, will now be described.

Suppose that in any position of the paper carriage 189 none of the column totalizers 103 is in active position and that the operator depresses one of the calculating keys 2 by mistake. The corresponding totalizing slide 34 can not descend since the controlling plate 190 arranged to each totalizer 103 (Fig. 10) does not engage the unlocking lever 191 (Figs. 10 and 11). There through the locking lever 192 is not released and the locking beam 193 does not swing out in the clockwise direction. Therefore the slide 34 which coacts with its incline 194 upon the locking beam 193 is held in its position and therefore it does not descend. The camplate unit 19, 20 allotted to the calculating key which has been depressed by mistake, is coupled to, and rotates with, the driving shaft 23, but, since the totalizing slide 34 does not descend, its wedge 37, Figs. 3 and 5, cannot move the member 40 into active position, nor can the edge 150 of the link 143 act on the end 151 of the push rod 152. In both cases, the corresponding type lever 89 is not operated. Consequently, values not intentionally introduced, and consequently not calculated, will not be typed.

As described, when numbers are typed by the number typing keys 195 from "0" to "9", the type levers 89 are operated by the usual power drive, that is from the serrated or cam shaft 196 rotating clockwise continuously. Depression of a key 195 connects the hook 197 to the shaft 198 through key bar 198 and member 199 the double-armed lever 87 is turned clockwise and the type lever 89 is thrown against the platen 90. Consequently, while upon operation of the calculating keys 2 and the total taking key 104 the type levers 89 are under the control of the driving shaft 23 for the calculating mechanism they are under the control of the shaft 196 when the number typing keys 195 are operated.

It is understood that the expression "total taking" in the foregoing description is intended to include any kind of total taking and also subtotal taking.

ROBERT ANSCHÜTZ.